

Aviation Maintenance Technician Second Class



U.S. Coast Guard Pamphlet No. A20601 (05/98, Change 1)

Aviation Maintenance Technician Second Class

Creation Date: May 1998

Revision Date: This course incorporates

Errata 1 dated 01 June 1999 and Errata 2 dated 01 December 1999

Next Review Date: May 2001

Nonresident Training U. S. Coast Guard Aviation Technical Training Center Elizabeth City, NC 27909-5003 (252) 335-6418

QUESTIONS ABOUT THIS TEXT SHOULD BE ADDRESSED TO THE SUBJECT MATTER SPECIALIST FOR THE **AVIATION MAINTENANCE TECHNICIAN** (AMT) RATING

References

Selected References

This pamphlet contains original material developed at AVTECHTRACEN Elizabeth City, NC. The references used to develop this pamphlet are listed throughout the text under the corresponding performance qualification number. A complete list of these references is provided in Appendix C.

Introduction

The purpose of this pamphlet is to provide guidance and references to assist you in completing the AMT2 Performance Qualifications and the End-of-Course Test.

Important Note

This text has been compiled for TRAINING ONLY. It should NOT be used in place of official directives or publications. The text information is current according to the references listed. You should, however, remember that it is YOUR responsibility to keep up with the latest professional information available for your rate. Current information is available in the Enlisted Qualifications Manual, COMDTINST 1414.8 (series).

How to Proceed

This pamphlet contains assignment objectives and syllabus objectives which are used to describe the tasks you will need to perform to satisfy the requirements of the performance qualifications.

- For the assignments: Read the text and answer the self-quiz at the end of each assignment. The 5.B.GTG assignment should be completed before attempting to complete any of the Aircraft Maintenance performance qualifications (5.B. series).
- For the syllabus: Read the performance, then read the syllabus performance objectives and refer to the applicable references listed to perform the task. Performance of these objectives should be completed on your assigned aircraft type (only one type is required).

-The initial line (_______) in the syllabus portion is used to keep track of each task you have completed. This entry should be completed by a petty officer at least one pay grade higher than the student.

End-of-Course Test (EOCT)

To prepare for the EOCT, read the assignment objectives and carefully study the information contained in the text. You should also review the self-quiz for each assignment along with the pamphlet review quiz. Answers and references are found on the page following each quiz. Remember, these questions are only samples of the types of questions on the EOCT.

The syllabus performance objectives will NOT be tested on the EOCT due to their aircraft specific nature.

Notice to Student (Continued)

Performance Qualifications Sign-Off

As PROFICIENCY in each performance qualification is demonstrated, the DATE and INITIALS columns of the Record of Performance Qualifications (CG-3303C-19, Tab-1 of this pamphlet) should be completed by your supervisor. A "Notice to Supervisor" page is included to provide guidance for your supervisor. Ensure that your supervisor reads the instructions on that page. Also, Tab-1 should be used as your permanent record documenting the completion of each performance qualification. It is up to YOU to ensure that this documentation is complete in order to be considered eligible for the Service Wide Exam (SWE).

This pamphlet was developed as a guide to assist you in completing your performance qualifications. You should **USE IT.**

Performance Qualification Numbers

The performance qualifications beginning with a "5" are the requirements for qualifying for E-5. Also, performance qualifications ending in "c" are common for all aviation ratings. The assignments need not be completed in any specific order.

Student Feedback Form

A student feedback form (Appendix D) is provided for you to submit recommendations to the subject matter specialist. As you read the training material, you may have comments, such as

- suggestions for adding or deleting information,
- notations of errors in the text (include page number and your reference material), or
- questions about the text or a practice exercise.

Write your comments in sentence form on Appendix D. Tear it out of the pamphlet and mail it through your unit's mail room. The subject matter specialist will review all submissions received.

SWE Study Suggestions

Servicewide exam questions for your rate and pay grade are based on the Professional and Military Requirements sections of the Enlisted Qualifications Manual. If you use the references listed in your rating section of the Enlisted Qualifications Manual, COMDTINST 1414.8 (series), you should have good information for review when you prepare for your servicewide exam.

Introduction

The purpose of this pamphlet is to provide guidance and references to assist the student in completing the AMT2 performance qualifications and the EOCT. It also identifies what the student is expected to know and demonstrate for each performance qualification.

NOTE

This text has been compiled for TRAINING ONLY. It should NOT be used in place of official directives or publications. The text information is current according to the references listed to date.

Supervisor Guidelines

Supervisors should follow the guidelines provided below to improve the consistency of the training process:

- The syllabus portion of this pamphlet contains objectives for each
 performance qualification. The student should be able to
 demonstrate proficiency in each of the objectives in order to meet
 the requirements for the performance qualification. The supervisor
 should use the syllabus to determine if the student is proficient in
 each performance qualification.
- An initial line (_______) is provided to keep track of each objective the student has completed, and should be initialed by a petty officer at least one pay grade higher than the student. The initial line also provides a quick way to chart the student's progress and allows you, the supervisor, to assess the student's training needs and to plan accordingly.
- The supervisor should provide the discrepancy information or scenarios for the syllabus objectives requiring this information. It's up to the supervisor to decide whether or not to use actual discrepancies such as CG 4377 Part III or CG 4377B (No Fly) entries or to give the student realistic scenarios to work on. Again, the supervisor should decide what method will work best for their training environment.

Notice to Supervisor (Continued)

Performance Qualifications Sign-Off

NOTE

It is highly recommended that all supervisors review the information covered in the "Administration" section of the Enlisted Qualifications Manual, COMDTINST 1414.8 (series) before any performance qualifications are signed-off or waived.

As PROFICIENCY in each performance qualification is demonstrated, the DATE and INITIALS columns of the Record of Performance Qualifications (CG-3303C-19, Tab-1 of this pamphlet) should be signed-off by the student's supervisor. Also, Tab-1 should be used as the student's permanent record documenting the completion of each performance qualification.

For More Information

For more detailed information on completion of the Record of Performance Qualifications, refer to (COMDTINST M1414.8, series).

In This Pamphlet

TITLE

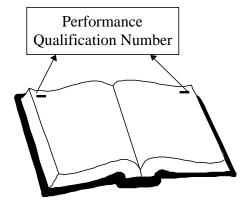
PAGE

References	ii
Notice to Student	iii
Notice to Supervisor	v

Performance Qualification Assignments

ASSIGNMENTS

The assignments are numbered and arranged in the same manner as are the performance qualifications; Alpha-Numeric. The actual performance qualification number is listed in the upper-outer corner of each page which allows you to quickly scan the pages in order to find the specific performance qualification section. See the example below:



APPENDIXES

Pamphlet Review Quiz
Pamphlet Review Quiz Answer KeyB-1
References
Student Feedback FormD-1
AMT Record Of Performance Qualifications Tab-

Blank Page

Syllabus 5.A.01c

Performance

COMPLETE assigned aircraft Aircrewmember Syllabus.

Performance Objective

Given an assigned aircraft type, **COMPLETE** the applicable Aircrewmember course and the syllabus IAW your assigned station's instructions.

NOTE

After being assigned an aircraft type, contact your unit's Educational Services Officer for course enrollment.

5.A.01c Blank Page

2

Syllabus 5.A.02c

Performance

ORDER aircraft parts.

Performance Objective 1

Given the name of an aircraft part and the name of the related system, **RESEARCH** the information needed to order the part using the applicable aircraft Illustrated Parts Catalogs and the Federal Logistics Data System (Fed Log).

NOTE

The E-4 Aviation Administration Pamphlet #A1AA03, included with the Airman Course, contains the information required to help you complete this performance objective.

Performance Objective 2

Using the information obtained from performance objective 1, **SUBMIT** an aircraft parts requisition to supply IAW the Aeronautical Engineering Maintenance Manual, COMDINST M13020.1 (series) and local station instructions.

1



5.A.02c Blank Page

2

Objectives

To successfully complete this assignment, you must study the text and master the following.

- **STATE** in writing how often a shop technical publications audit should be completed.
- **STATE** in writing the two primary functions of a technical library audit.
- **STATE** in writing the time allowed for completion of a shop technical publications audit.
- **VERIFY** (compare) publication status on an audit report.
- **ANNOTATE** (write) correct entries on an audit report that contains discrepancies

References

The information contained in this assignment can be found in the Technical Information Management and Ordering System (TIMOS) Users Manual, CGTO PG-85-00-50 and ACMS cards.

5.A.03c Overview

Introduction

In this reading assignment you will complete procedures required to perform an audit of your shop technical publications library.

Aircraft technicians frequently use technical publications and directives such as ACMS cards and maintenance manuals to perform complex aircraft maintenance.

One of your tasks may be to perform periodic audits of your shop or workcenter technical library to verify all publications and directives contain the most current changes. This will ensure that all technicians are received valid maintenance information

In This Assignment

Subject	Page
Technical Information Management and Ordering System	3
Technical Library Audits	4
Publication Audit Report	7
Audit Report Information	9
Performing Publications Audit	10
Publication Audit Practice.	17
Publication Audit Feedback	23
Technical Publications Audit Self-Quiz	24
Technical Publications Audit Self-Quiz Feedback	25
Syllabus	26

Introduction

In this section we will discuss a general background of the Technical Information Management and Ordering System (TIMOS) used by the Coast Guard. This instruction will provide some insight on how a technical publication audit fits into the TIMOS system.

Background

TIMOS is a computerized publication ordering and inventory management system designed to assist air stations with establishing and maintaining their technical publication requirements. This system also allows authorized users to approve or reject orders, as well as track publication inventories at air stations. The system functions have been designed to correspond to the order of events in which a publication order is processed.

Air Stations/ARSC Communications

This system allows Coast Guard air stations to communicate with the technical publications section at AR&SC to:

- Order Publications
- Establish or change initial publication distribution
- Follow up/cancel existing orders

Publication Updates

Once the unit's publication requirements are transmitted to the TIMOS computer database, all technical publications will be on automatic distribution for necessary periodic updates.

Introduction

Although the TIMOS publication tracking software is an excellent tool for managing and maintaining a unit's publication library. An audit of all-technical publications and directives is required every four months as a check-and-balance to the system.

This audit is tracked on ACMS and is signed-off by the librarian when completed.

Location of Technical Libraries

Not all of a unit's technical publications and directives are located in a central QA library. Extra copies of applicable publications and directives are also located in shops or work center technical libraries. Some publications may be unique to your shop alone.

Your Responsibilities

Your responsibilities during the audit will be to assist the librarian by cross-checking your shop publications and directives with the technical librarians records to ensure complete accuracy.

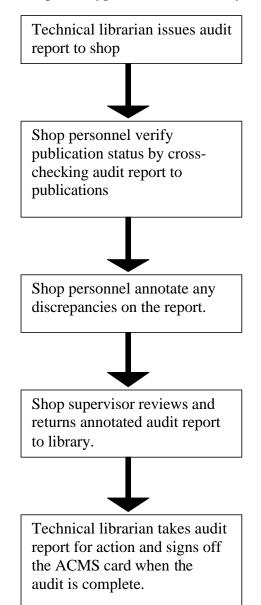
Function of a Publication Audit

The two primary functions of a publication audit are to:

- Ensure all of your technical publications and directives contain most current updated information.
- Provide an opportunity to review your publication requirements, and make recommendations for additions or deletions to the shop technical library.

Audit Process

The flowchart below depicts a typical technical library audit process:



5.A.03c Blank Page

Definition

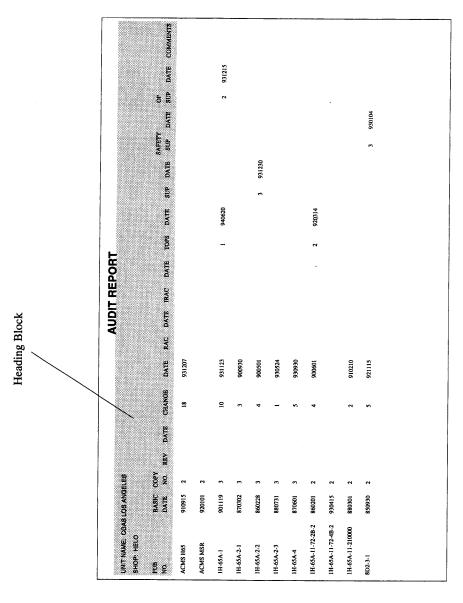
The Publication Audit Report is a computer printout generated by the TIMOS system. It is a comprehensive listing of a shops technical publications including all updates that have been issued.

Purpose

The technical librarian issues an audit request to each shop every four months, or at the shop's request. This report allows shop personnel to verify the status of their shop's publications by cross-checking the list with each publication.

Audit Report Example

Below is an example of a typical shop publications Audit Report.



Introduction

In this section we will explain the information displayed on a typical publication Audit Report. Most of the terms and information contained on the report are self-explanatory, but there are some items that you may be unfamiliar with.

Heading and Information Blocks

In the illustration on the preceding page, the Audit Report is divided into two major sections as follows:

The shaded area of the example highlights the "Heading Block" which is common to all Audit Reports. The heading block contains several categories used to divide data displayed in the "Information Block" section.

The unshaded area of the example depicts an information block, which contains data about your particular shop library contents.

Heading Categories

The first column of the Heading Block is the publication number followed by the basic date. The copy number column is for the librarians use only so it is disregarded. The next 16 columns list each type of update that may be issued for a publication followed by its' effective date. The last column is for any comments that the librarian may have entered into the database about the publication.

Introduction

In this section we provide guidance on how to perform a technical publication audit with a condensed demonstration. In this scenario, the librarian sends a memorandum (memo) along with the audit report outlining what must be done. At your unit, you may or may not receive a similar memo. You must complete the audit and return the report to the library within five working days.

Scenario

Petty Officer Gimble, of the helo shop, has received a memo with an attached audit report (see next page) from the unit technical librarian requesting an audit of the helo shop technical library. The memo below provides instructions on how to complete the audit.

Library Audit Memo Example

The following example gives PO Gimble directions on completing the audit.

From: AST1 Roscher To: All Shops Supervisors

- 1. It is time for the technical publication library audit. I am requesting your assistance in performing an audit of your respective shop technical library. Listed below are the steps required to complete your audit.
 - A. Verify that the attached Audit Report is for your shop.
 - B. Ensure all publication updates that have been issued by QA are installed in your shop publications.
 - C. Locate each manual on your report and verify the following information:
 - (1) Basic Date—Should match basic date on publication title page.
 - (2) All updates listed on the report are installed in your publications.
 - D. You may disregard the copy number column.
 - E. All entries/corrections to the audit report should be in red ink. As each publication is checked, place a checkmark next to the manual number, If there are discrepancies, please circle the incorrect information and enter the actual information from the publication.
- 2. After all manuals have been checked return the annotated Audit Report to AST1 Roscher within five working days. Thank your for your assistance.

AST1 Roscher

Technical Librarian

Audit Report Example

Below is an example of the Audit Report PO Gimble received for the Helo shop.

INIT NAME: COAS SI IZABETU CITA	CI IZABET	5					4	NODI	TRE	AUDIT REPORT									
SHOP: HELO		5																	
PUB NO.	BASIC	COPY NO.	REV	DATE	CHANGE	DATE	RAC	DATE	IRAC	DATE	TOPS	DATE	SUP	DATE	SAFETY	DATE	OP SUP	DATE	DATE COMMENTS
A1-H60CA-IPB-450 930806	930808	7			-	940115			7	931202									
A1-H60CA-140-200	930131	7																	
A1-H60CA-140-400	930131	60			-	930808													
A1-H60CA-150-100 910531	910531	3				930205													
A1-H60CA-150-200 910531	910531	3			7	930205													
A1-H60CA-150-300 900709	900109	6			2	930205													
A1-H60CA-150-400	920531	3			е.	930808													
A1-H60CA-220-100	910531	2				920531				•									
A1-H60CA-220-200	910531	7			4	930808											-		
A1-H60CA-220-300	920531	7			ĸ	930808			٠	931217									
A1-H60CA-220-400	920531	7			ws.	921115	2	930507											
A1-H60CA-240-100	920815	7			_	930205													
A1-H60CA-240-200	920815	7			2	930808													
							f												

Scenario (Continued)

After ensuring this audit report (see page 11) is for the helo shop, PO Gimble located the manual number A1-H60CA-220-300, and opens the manual to the title page (see next page).

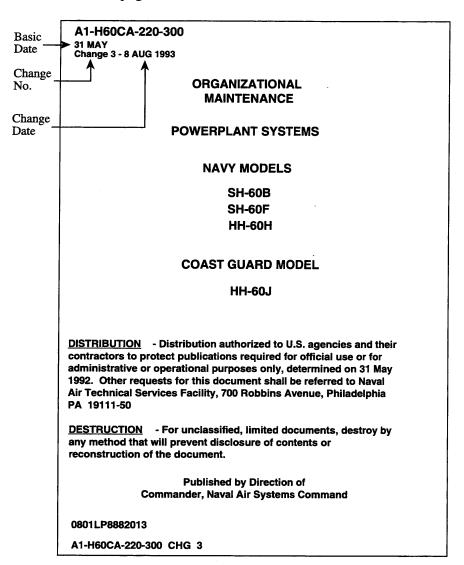
On the publication title page, PO Gimble notes the following information:

- Basic Date 31 May 92
- Change Number Change 3
- Change Date 08 Aug 93

This information is consistent with the audit list shown on the preceding page.

Title Page

Below is the title page for technical manual A1-H60CA-220-300.

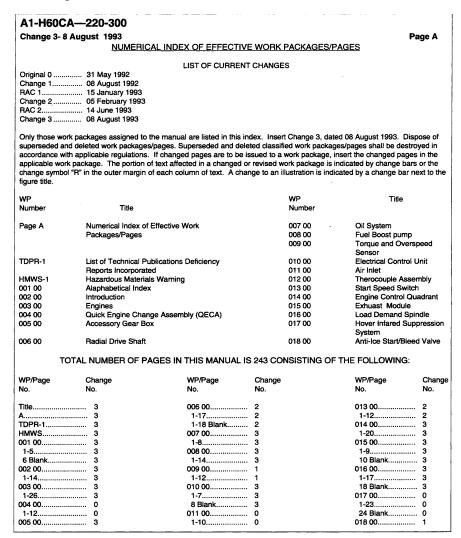


Scenario (Continued)

PO Gimble verifies all the changes shown on the List of Effective pages (below) are installed by cross checking actual pages in the manual.

According to the List of Effective pages, Changes 1-3 are effective Rapid Action Changes (RAC) should be installed.

All changes and RACs are confirmed to be installed.



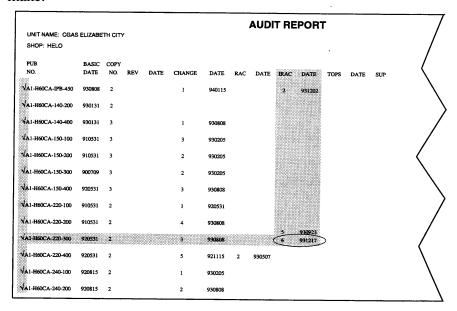
Scenario (Continued)

PO Gimble turns to the front of the manual looking for Interim Rapid Action Change (IRAC) #6, which according to the Audit Report shown below should be the latest IRAC installed in this publication. He doesn't find IRAC #6 but does find IRAC #5 dated 930923 (see example on next page).

This discrepancy is annotated on the Audit Report by circling the incorrect information, and writing in actual information from the manual update.

Annotated Audit Report

After checking all the publications, PO Gimble annotated the Audit Report as shown below. The shaded areas highlight the information that PO Gimble was looking for and the entries he was requiring to make.



Example of Latest Supplement

The IRAC shown below is an example of the latest supplement installed in A1-H60CA-220-300.

ZZCCGGBA817

RUHGOAA T COMCARGRU SEVEN

RUHFPAA T HELOSUPPSECRON FIVE

RUHNABE T USS ABRAHAM LINCOLN

P 231920Z SEP 93 ZFD

FROM DPRO SIKORSKY STRATFORD CT//RAE60//

TO AIG ONE ONE SIX FIVE

ONE ONE THREE SEVEN FIVE

ONE ONE FOUR TWO ONE

ACCT DSGA4D

BT

UNCLASS//NO5600//

SECTION ONE OF ONE

SUBJ: HH-60 PROGRAM INTERMIN RAPID ACTION CHANGE NO.5 TO TECHNICAL MANUAL A1-H60CA-220-300,

POWERPLANT SYSTEMS, ORGANIZATIONAL LEVEL

MAINTENANCE MANUAL.

REF: A1-H60CA-220-300, WP 005 00, PAGE 2, STEP 5A.

1. PEN AND INK CHANGES TO THE TECHNICAL CONTENT OF A MANUAL ARE NOT AUTHORIZED. THE FOLLOWING TECHNICAL CONTENT CHANGE INFORMATION APPLIES TO THE ABOVE REFERENCED PAGE AND PARAGRAPH UNTIL A FORMAL CHANGE IS RELEASED.

REVISE FIRST BULLET OF CAUTION PRECEEDING STEP 5A TO READ AS FOLLOWS:

ENGINE MUST BE SHUT DOWN AND ALLOWED TO COOL TO A TGT OF 80 DEGREES C (176 DEGREES F) OR BELOW BEFORE CLEANING SOLUTION IS SPRAYED INTO ENGINE.

BT

#8323

Introduction

In this section you will practice performing publication audits on selected technical manuals.

This practice exercise consists of a scenario, a procedure table, an example Audit Report, and an example List of Effective Pages. This information is located on the following pages.

The manual selected for this exercise may or may not contain discrepancies in accordance with the information provided in the Audit Report.

Directions

Read the scenario below carefully and follow the procedure table on the next page to complete the exercise. Review the example publication (TO 8D2-3-1) on page 20-22 and annotate the Audit Report on page 19 with you results.

Try to complete the practice exercise without assistance, but should you have trouble, review the appropriate section of this assignment.

Scenario

You are stationed at Air Station Los Angeles. The technical librarian sends you an audit report (page19) and a memo requesting you to perform an audit of the helo shop library.

You have started your task, and up to now you have found no discrepancies. You locate the last manual on the audit report, T.O. 8D2-3-1, and compare the data to the title page, the List of Effective pages, and the Safety Supplement.

Verification indicates that all the changes up to and including Change 4 are installed in T.O. 8D2-3-1.

While performing the audit, you determine that your shop publication requirement have not changed.

Procedure Table

Follow this procedure table to complete the practice exercise.

Step	Action
1	Verify Audit Report is for your shop.
2	Verify basic date of manual.
3	Verify latest revision and date.
4	Verify latest change number and date.
5	Verify all changes shown on the list of effective pages are installed in the manual.
6	Verify the numbers and the dates of the following applicable updates: Rapid Action Change (RAC), Interim Rapid Action Changes (IRAC), Technical Ordering Page Supplements (TOPS), Supplements (SUP), Safety Supplements (SAFETY SUP), Operational Supplements (OP SUP).
7	Place a check mark next to manuals as they are completed.
8	Identify discrepancies by circling incorrect information and writing in actual information.
9	Return the report to the library after completing the audit.

Audit Report Example

While performing the audit, annotate this example of the helo shop audit report with the required information.

UNIT NAME: CGAS LOS ANGELES SHOP: HELO PUB BASIC COPY NO. DATE NO. ACMS H65 910915 2 ACMS MSR 920101 2 IH-65A-1 901119 3	REV	DATE (CHANGE D 18 9 10 9 4 9	DATE 1	RAC E	DATE IRAC	ב ב										
PASIC BASIC DATE SH65 910915 SMSR 920101	REV					OATE											
BASIC DATE DATE S H65 910915 S MSR 920101	REV					OATE											
910915 920101				31207				DATE	TOPS	DATE	SUP	S	SAFETY SUP	DATE	op SUP 1	OATE (DATE COMMENTS
920101																	
				931123					-	940620					2 9	931215	
1H-65A-2-1 870302 3			4	900930													
1H-65A-2-2 860228 3				900501							60	931230					
IH-65A-2-3 880731 3			1 9	930524													
1H-65A-4 870601 3			8	930930													
IH-65A-11-72-2B-2 860201 2			4 9	900601					ペ.	920314							
1H-65A-11-72-4B-2 930415 2															-		
1H-65A-11-210000 880301 2			2 9	910210													
8D2-3-1 850930 2			ر اور	921115									ۍ ب	930104			

Publication Supplement Example

Use this Safety Supplement example to complete the practice exercise.

SS	SS SS SS SS SS SS SS SS T.O. 8D2-3-1 SS-3	SS
SS	TECHNICAL MANUAL SAFETY SUPPLEMENT	SS
SS	OPERATION SERVICE AND REPAIR AIRCRAFT NICKEL CADMIUM	SS
SS		SS
SS	THIS PUBLICATION SUPERCEDES T.O. 8D2-3-1SS-1 DATED 09 OCTOBER 1992, and supplements T.O. 8D2-3-1 DATED 30 SEPTEMBER 1985. Reference to this supplement will be made on the title page of the basic manual by personnel responsible for maintaining the publication in a current status.	SS
SS	DISTRIBUTION STATEMENT B - Distribution authorized to U.S. Government agencies only, for administrative or operational use (04 JAN 1993) . Other requests for this document shall be referred to Sacramento ALC/TILBE, 3200 Peacekeeper Way, Suite 1 McCelllan AFB, CA 95652.	SS
SS		SS
SS		SS
SS	PURPOSE. To update the basic manual. 04 Jan 1993	SS
SS	INSTRUCTIONS. a. On page 4-11, paragraph 4-49 is added to read as follows.	SS
SS	4-49. HEATER BLANKET WIRING HARNESS: Two element heater blankets are to be wired in series with each other, and not in parallel.	SS
SS	WARNING If wired in parallel, one element may overheat. This may cause internal shorting of cell(s) resulting in the failure of battery and cell case rupture.	ss
SS	THE END 1/ (2 Blank)	ss
SS	SS SS SAFETY SUPPLEMENT SS SS SS	SS

Title Page Example

Use this Title Page example to complete this practice exercise.

T.O. 8D2-3-1

TECHNICAL MANUAL

OPERATION, SERVICE AND REPAIR

AIRCRAFT NICKEL CADMIUM STORAGE BATTERIES

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30 SEPTEMBER 1985 CHANGE 4 - 13 MAY 1992

List of Effective Pages Example

Use this List of Effective Pages example to complete the practice exercise.

		INSERT LA	NTEST CHANGED PA	AGES, DESTROY SUPERSEDE	D PAGES
LIST OF EFFE	CTIVE PA	GES			
		NOTE:	vertical line in the di	affected by the changes is indica outer margins of the page. Chang licated by miniature pointing hand diagrams are indicated by shade	gesto Is.
Dates of issue for o	riginal and cha	inged pages are:			
Original030 Change113 Change204 Change308 Change404	MAY 87 MAY 89 JUL 91 MAY 92	ication is 52 consisting	of the following	ng:	
Page	Change	-		- .	Channa
No.	*No.	Page No.	Change *No.	Page No.	Change *No.
140.	140.	140.	NO.	INO.	NO.
Title	4	4-3	2	7-3	1
A	4	4-4	4	7-4	1
i	2	4-4.1 Added	2		
i-v	3	4-4.2 Blank	2		
vi Blank	3	4-5	1		
	2	4-6 - 4-7	3		
1-1	3	4-0 - 4-7	5		
1-1 1-2 - 1-3	0	4-8 - 4-11	0		
1-2 - 1-3	-		-		
1-2 - 1-3 1-4	0	4-8 - 4-11	0		
	0	4-8 - 4-11 4-12 Blank	0		
1-2 - 1-3 1-4 1-5 1-6	0 3 1	4-8 - 4-11 4-12 Blank 5-1 5-2 - 5-3	0 0 0		
1-2 - 1-3 1-4 1-5	0 3 1 0	4-8 - 4-11 4-12 Blank 5-1	0 0 0 1		
1-2 - 1-3 1-4 1-5 1-6 1-7	0 3 1 0	4-8 - 4-11 4-12 Blank 5-1 5-2 - 5-3 5-4	0 0 0 1 4		
1-2 - 1-3 1-4 1-5 1-6 1-7 1-8 - 1-9 1-10	0 3 1 0 1	4-8 - 4-11 4-12 Blank 5-1 5-2 - 5-3 5-4 5-5 5-6	0 0 0 1 4 1		
1-2 - 1-3 1-4 1-5 1-6 1-7 1-8 - 1-9	0 3 1 0 1 0 3	4-8 - 4-11 4-12 Blank 5-1 5-2 - 5-3 5-4 5-5 5-6 5-7	0 0 0 1 4		
1-2 - 1-3 1-4 1-5 1-6 1-7 1-8 - 1-9 1-10 2-1	0 3 1 0 1 0 3 4	4-8 - 4-11 4-12 Blank 5-1 5-2 - 5-3 5-4 5-5 5-6	0 0 0 1 4 1 0 2		
1-2 - 1-3	0 3 1 0 1 0 3 4 3	4-8 - 4-11 4-12 Blank 5-1 5-2 - 5-3 5-4 5-5 5-6 5-7 5-8	0 0 0 1 4 1 0 2		
1-2 - 1-3	0 3 1 0 1 0 3 4 3	4-8 - 4-11 4-12 Blank 5-1 5-2 - 5-3 5-4 5-5 5-6 5-7 5-8 6-1	0 0 0 1 4 1 0 2 4 0		

USAF

A Change 4

Feedback

Your annotated Audit Report should be similar to the one shown below. The shaded areas highlight the entries you should have made. If you had troubles with this exercise, please review the appropriate section of this assignment.

UNIT NAME: CGAS LOS ANGELES	LOS ANG	8313					⋖	IODI	T RE	AUDIT REPORT									
SHOP: HELO																			
PUB NO.	BASIC	COPY NO.	REV	DATE	CHANGE	DATE	RAC	DATE IRAC	IRAC	DATE	TOPS	DATE	SUP	DATE	SAFETY SUP	DATE	OP SUP	DATE	COMMENTS
ACMS H65	910915	7			18	931207													
ACMS MSR	920101	2																	
IH-65A-1	901119	3			01	931123					-	940620					7	931215	
IH-65A-2-1	870302	æ			6	900930													
IH-65A-2-2	860228	e			4	102006							3	931230					
(H-65A-2-3	880731	e			-	930524													
IH-65A-4	870601	æ			ĸ	930930													
IH-65A-11-72-2B-2	860201	7			4	109006					8	920314	•						
IH-65A-11-72-4B-2	930415	7																-	
(H-65A-11-210000	880301	7			2	910210													
3D2-3-1	850930	7		V	Chg 4	920513	^								m	930104			

Questions

Answer the following questions on technical publications audits.

1) How often should all shop technical publications and directives be audited?

1) _____

2) From memory, write the two primary functions of a technical library audit.

a) _____

b) _____

3) After the audit report is issued, how much time is allowed for completion of a shop technical publication audit?

a) _____

Feedback

Compare your answers to the feedback provided below. If you had trouble with the Self-Quiz, please review the appropriate page of this reading assignment.

Questions	Answers	Reference
1.	Every four months	4
2.	a. Ensure publications contain the most current changes/updates.b. Provides an opportunity to review your shop technical library requirements.	4
3.	five working days	10

5.A.03c Syllabus

Performance

AUDIT technical publication directives.

Performance Objective 1

Given a technical publications audit report, **VERIFY** the shop publications status compared to the audit report IAW the Technical Information Management and Ordering System, CGTO PG-85-00-50, and the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)

Performance Objective 2

Given a technical publications audit report, **ANNOTATE** (write)correction entries on the audit IAW the Technical Information Management and Ordering System, CGTO PG-85-00-50, and the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)

Objectives

To successfully complete this assignment, you must study the next and master the following objectives:

- **STATE** in writing the forms used for recommending a change to publications.
- **COMPLETE** a CG-22 form with the required information from a given scenario.
- **COMPLETE** an AF Form 847 with the required information from a given scenario.

References

The information contained in this assignment can be found in the following references:

- Aeronautical Engineering Maintenance Management Manual, COMDINST M13020.1
- Aeronautical Engineering Process Guide, (CG-22 Process), CGTO PG-85-00-20

5.A.04c Overview

Introduction

In this reading assignment, you will learn how to fill out and submit the appropriate form used to propose changes to directives, ACMS, or technical publications.

As a Coast Guard Petty Officer and an aircraft technician you must rely upon many different publications to perform your duties. Keeping these publications up to date and as reliable as possible is everyone's responsibility. There will be times when you will read something you know is incorrect and affects the meaning of instructive information. These errors could be as simple as a typing error or as critical as a missing step on an ACMS card. When an error is encountered, **You** should attempt to get corrected. If you wait for the other person to submit a change form, the error may never be corrected.

In This Assignment

In this assignment we will discuss the following topics:

Subject	Page
Publication Improvement Recommendation Forms	3
Completing the CG-22 Form	5
CG-22 Form Practice	10
CG-22 Form Feedback	12
Completing the AF Form 847	13
AF Form 847 Practice	16
AF Form 847 Feedback	18
Publication Improvement System Self-Quiz	19
Publication Improvement System Self-Quiz Feedback	20
Syllabus	21

Introduction

Publication improvement recommendation forms are used to recommend changes, error corrections, updates or deletions to all publications and ACMS/MSR maintenance procedure cards in use by the Coast Guard.

Types of Forms

The two types of forms discussed in the instructions and used to recommend changes to publication are as follows:

- CG-22, Aeronautical Publication Change Recommendation Form
- AF Form 847, Recommendation for Change of Publication (Flight and Standardization Manual)

5.A.04c Blank Page

Introduction

The Aeronautical Publication Change Recommendation Form (CG-22) is used to recommend changes to correct errors which affect the meaning of instructive information or procedures contained in technical manuals or procedures contained in technical manuals or ACMS/MSR cards except aircraft flight manuals (-1 series).

Availability of Forms

The CG-22 Form can be obtained from your shop supervisor or the Quality Assurance (QA) office. If you have access to a CG standard work station II, this form is available on the SAE Forms Plus Laser Library, or Jet Filler on standard work station III. If more room is needed than is available on the CG-22 Form, also obtain a CG-22 continuation sheet (see example on page 8).

Operation

The technician/mechanic who originates a CG-22 form fills out a draft copy and submits it to the unit's QA office. The proposal is reviewed by QA personnel for validity and technical accuracy. They then make necessary corrections without changing the intended meaning of the original proposal. Using a CG standard work station, QA personnel transfer the information onto the computer version of the form and then print out what becomes known as the original. You, the originator, will be asked to review this original to ensure it still says what you intended to say.

Signatures

Once the originator and QA are in agreement, the CG-22 Form is signed by the originator and the QA officer. It is then forwarded to the unit engineering Officer for local approval.

Control Number

The control number enables tracking of individual CG-22's. After the Engineering Officer approves the CG-22, the ACMS Field Terminal Operator will enter the information into the ACMS CG-22 Tracking System. The ACMS then assigns a control number for the CG-22 which is handwritten on the form.

Distribution

After the control number is entered on the CG-22, it is returned to QA for submission to the appropriate aircraft Prime Unit. Changes that are not specific to any aircraft type can be sent to any Prime Unit. Distribution is limited to the original CG-22 Form being submitted to Prime Unit.

CG-22 Block Entry Table

The following table contains remarks for the blocks that should be completed prior to submitting the CG-22 Form to the Quality Assurance Office. Only the applicable blocks from block #1 through block #24 should have an entry. See example on the following page.

Block #	Entry/Remarks
1	Insert unit OPFAC number
2	Insert unit name to identify the originating unit.
3	Insert the date (MM DD YY – i.e. 10 25 99).
4	Quality Assurance will insert the Control Number
5	Insert change title if applicable
6	Insert Originator name
7	Insert originator phone
8	Indicate the type of publication affected.
9	Enter aircraft type or equipment affected by this change.
10	Insert yes or no if change is procedural.
11	Insert yes or no if change affects a TCTO.
12	Insert the publication number.
13	Insert the revision date.
14	Insert the affected page(s)
15	Insert the ATA chapter
16	Insert the affected paragraph
17	Insert the affected figure (if applicable)
18	Insert the affected Commandant Change (if applicable)
19	Insert the affected MPC number (if applicable)
20	Insert the affected date of MPC (if applicable)
21	Insert the affected page of MPC (if applicable)
22	Insert the affected interval change (if applicable)
23	Describe the manual deficiency and recommend changes using clear and
	concise terms. Use a continuation sheet if necessary.
24	Describe the MPC deficiency and recommend changes using clear and concise
	terms. Use a continuation sheet if necessary. (if applicable)
25	Ensure QA receives and signs original copy of CG-22

Example of a Completed CG-22

The following is an example of a CG-22 Form that was submitted by the Aviation Technical Training Center.

AERONA	AUTICAL PU	BLICATIO	N CHANGE	RECOMME	NDATION
1. OPFAC 78 - 61300	UNIT ATTC, Elizabeth	City NC	3. DATE INITIATED	0 / 25 / 99	4. CONTROL NUMBER
5. CHANGE TITLE	ATTO, Elizabeti	6. ORIGINATOR (FI			93 - 016 - R 7. ORIGINATOR PHONE
			Paul. D. Doe	AVTC	(2 5 2) 335 - 6856
8. CG-22 TYPE	9. AIRCRAFT TYPE	•	10. PROCEDURAL (Y/		11. TCTO (Y/N)
Pub XX MPC Comb		HU-25	N N		NO
12. PUBLICATION NUMBER 1U - 25A	- 6WB		13. REV, DATE	02 / 04 / 84	14. PAGE 8 / 146 / 147
15. ATA CHAPTER	16. PARAGRAPH		17. FIGURE		18. COMDT. CHANGE (Y/N)
23 - 51 - 00		39a , 1e			
19. MPC NUMBER	20. DATE		21. PAGE		22. INTERVAL CHANGE (Y/N)
23. PUBLICATIO					
incorrect. In CPN 622-414 this resister sl	tates that a 47 Oh accordance with 19-001, Drawing I hould be 470 Ohr esister value to 47	Collins "Produ number 671-09 ns, 1 Watt.	ction Test Requi 185-001, Rev R, s	rements", Audio	Control Unit,
25. LOCAL QA (Signature) 27. PRIME UNIT REMARKS:		romano otas 1860 o de junto educar	26. ENGINEERING OFF	ICER OR DESIGNATED REI	PRESENTATIVE (Signature)
				28. DATE OUT:	
29. ACTION CODE (A/P/D/X)		30. PRIORITY	31. TOPS (Y/N)	32. SIGNATURE	
APP PAR DISAPI 33. TECHNICAL SERVICES REMARKS:	P CANCEL	U/N/R	Y / N		
35. ACTION CODE (A/P/D/X) APP. PAR DISAPP	- CANCEL	36. PRIORITY U/N/R	37. TOPS (Y/N) Y/N	34. DATE OUT: 38. SIGNATURE	
39. RCM SIGNATURE:	Eddings spirit on the spirit spirit	A STANDARD A STANDARD A STANDARD AND	40. G-EAE-2 SIGNATUR	akultusia kanada itanatama alta tama kanado o RE:	e in in in managaris group deserbarant provincia provincia provincia de la companya managa de la companya de l
(Interval Changes Only)			(COMDTINST Chang	ges Only)	
41. DATE OUT: 42. CODE A / P / D	/X 43. PRIORITY	, J/N/R	44. DATE OUT:	45. CODE A/P/D/X	46. PRIORITY U/N/R
47. TPS MANAGER Signature	erija 20. graf izanska atik kalendaria d	Date:	48. TPS FINAL: Signature	ni, ann taga i a ta air i an lathairtean an tairean an air aich	Date:
49. MPC COTR:	windowski nazwoka o pod on kosobi wodo nazw	KANSADARIN SANTAJAR DA KANJAR KANT	50. MPC FINAL:	a deserta que som cariospeques, permitente e elpojenego e	
Signature		Date:	Signature		Date:
Remarks:		CG F	Remarks: ORM 22		PREVIOUS EDITIONS OBSOLETE

CG-22 Continuation Sheet

This form is provided to give the originator more space to identify the deficiency and to make recommendations. When a continuation sheet is used, enter the appropriate page number, in the top, right-handed corner of the form. In blocks 1 through 4, enter the same information that is on page number one (see page 6).

		CONTINUATIO	N SHEET	 PAG	E OF
. UNIT	2. OPFAC	3. CONTROL NUMBER	4. ATA CODE		
	_				
		MANUA	L		
. MANUAL DEFICIENCY:					
RECOMMENDATION:					
				 (Use continuatio	n pages as necessa
ACMS DEFICIENCY:		ACMS		 	
<u> </u>					
RECOMMENDATION:					

Blank Page 5.A.04c

Introduction

Now that you have seen how a CG-22 Form should be filled out, practice by completing the form on page 11 using the following scenario.

Scenario

You are stationed at Coast Guard Air Station Clearwater, OPFAC # 07-20150. While reading about the operation of the T-56 engine in the Air Force T.O. 1C-130H-2-70GS-00-1, (Change 3, Date 12 Mar 96, paragraph 5-2.2 states that the engine low-speed operating range is between 9 and 30 degrees of throttle lever travel. However, paragraph 5-2.5, states that the low-speed operating range is between 9 and 40 degrees of throttle lever travel. To determine which statement is correct you look up the information in the CGTO 1C-130-1 Flight Manual. On page 1-37 and 1-38 the "Low-Speed Ground Idle Control" paragraph states that the operating range is between 9 and 30 degrees of throttle lever travel.

CG-22 Practice Form

Complete the form below using the information in the practice scenario given on the previous page.

А	ERONAL	JTICAL PU	BLICATIO	N CHANGE R	ECOMME	NDATION
1. OPFAC		2. UNIT		3. DATE INITIATED		4. CONTROL NUMBER
5. CHANGE TITLE	•		6. ORIGINATOR (F	rst, MI, Last, Rank)		7. ORIGINATOR PHONE ()
8. CG-22 TYPE Pub MPC	Comb	9. AIRCRAFT TYPE	•	10. PROCEDURAL (Y/N)		11. TCTO (Y/N)
12. PUBLICATION NUMB				13. REV. DATE		14. PAGE
15. ATA CHAPTER		16. PARAGRAPH		17. FIGURE		18. COMDT. CHANGE (Y/N)
19. MPC NUMBER		20. DATE		21. PAGE		22. INTERVAL CHANGE (Y/N)
23. PUBLICATION DEFICI RECOMMENDATION: 24. MPC DEFICIENCY: RECOMMENDATION:	ENCY:					
25. LOCAL QA (Signature)	1			26. ENGINEERING OFFICER	R OR DESIGNATED RE	EPRESENTATIVE (Signature)
27. PRIME UNIT REMARK 29. ACTION CODE (A/P/IC		do servano Alexandria do	30. PRIORITY	31. TOPS (Y/N)	28. DATE OUT: 32. SIGNATURE	of the engineering and the second
APP PAR.	DISAPP	CANCEL	U/N/R	Y/N	OZ. GIGIVATURE	
33. TECHNICAL SERVICE 35. ACTION CODE (A/P/IC			36. PRIORITY	37. TOPS (Y/N)	34. DATE OUT: 38. SIGNATURE	
APP PAR.	DISAPP	CANCEL	U/N/R	Y/N	III. GIGIOTISTE	
39. RCM SIGNATURE: (Interval Changes Only)	ana anti-mita di mata d Mata di mata d	and results to the enterior of the total and the enterior of 	ret i Frant Combine of Geralls bok i Color Lorent	40. G-EAE-2 SIGNATURE: (COMDTINST Changes C	only)	t terreta (1960 - 1960) er
41. DATE OUT:	42. CODE A/P/D/X	43. PRIORITY U	/N/R		45. CODE A/P/D/X	46. PRIORITY U/N/R
47. TPS MANAGER Signature	मिन्द्रोजीय कोल्प (पित्र का शिक्षामिक का १० विकास	1996 - Signific III (1986 - Are des des de la tradestrata en esta establica de la companya de la companya de l C	oate:	48. TPS FINAL: Signature	iga A a Tau aza eti sedi digateta a papateta eti eti eti eti e	Date:
49. MPC COTR: Signature	COMPLETE STATE OF THE STATE OF	etti nede en savr delen etnin et vidadur vide i mene vi	Date:	50. MPC FINAL: Signature	romania inclasivo pero un interpreta e vidi diferio	o communitario estratoria de la seria estratua de estratorio de la composición del composición de la composición de la composición del composición de la composición del composición de la composición del composición del composici
Remarks:				Remarks:		
			CG F	ORM 22		PREVIOUS EDITIONS OBSOLETE

Feedback

Your CG-22 Form should be completed as shown below. If there are errors, please review the scenario and pages 6 and 7 to correct any errors found.

AERONAUTICAL PUBLICATION CHANGE RECOMMENDATION						
1. OPFAC	I	UNIT		3. DATE INITIATED		CONTROL NUMBER
07 - 2015 5. CHANGE TITLE	U [CG	AS Clearwa	ter 6. ORIGINATOR (First		7/99	ORIGINATOR PHONE
			Your Name			()
8. CG-22 TYPE Pub X MPC	Comb. 9.	AIRCRAFT TYPE	C - 130	10. PROCEDURAL (Y/N) Yes	11	. тсто (Y/N) No
12. PUBLICATION NUMBER			C - 150	13. REV. DATE		. PAGE
1C-130H-2-7				03 / 12 17. FIGURE		5-5 . COMDT. CHANGE (Y/N)
15. ATA CHAPTER 7.6	I	-2.5		17. FIGURE	10	No
19. MPC NUMBER		DATE		21. PAGE	22	. INTERVAL CHANGE (Y/N)
23. PUBLICATION DEFICIE	NCA.					
closed when the coordin Idle Contro RECOMMENDATION: Change para	the thrott ator). The l range is graph 5-2.5	tle is between C-130 Flibetween 9	geen 9 and 40 ght Manual, and 30 degre	pages 1-37 & ees.	nrottle leven 1-38 state the e switch is o	idle switch is travel (read on ne Low-Speed ground closed when the n the coordinator).
24. MPC DEFICIENCY:						
RECOMMENDATION:						
25. LOCAL QA (Signature)				26. ENGINEERING OFFICE	R OR DESIGNATED REP	RESENTATIVE (Signature)
27. PRIME UNIT REMARKS					28. DATE OUT:	
29. ACTION CODE (A/P/D/		0411051	30. PRIORITY U/N/R	31. TOPS (Y/N) Y/N	32. SIGNATURE	
APP PAR 33. TECHNICAL SERVICES	DISAPP	CANCEL	U/N/K	I I/N	e a la companya da a companya	o tamina and a transfer of the state of the
S. Issued State of the State of					34. DATE OUT:	
35. ACTION CODE (A/P/D/	×)		36. PRIORITY	37. TOPS (Y/N)	38. SIGNATURE	
APP PAR		CANCEL	U/N/R	Y/N		No. 12 Commence of the Section
39. RCM SIGNATURE: (Interval Changes Only)				40. G-EAE-2 SIGNATURE: (COMDTINST Changes	Only)	
41. DATE OUT:	42. CODE	43. PRIORITY	/N/D	44. DATE OUT:	45. CODE A/P/D/X	46. PRIORITY U/N/R
47. TPS MANAGER	A/P/D/X	etti valta ira, ja jalkalluksijaksijaksijaksi	/ N / R	48. TPS FINAL:	AIP/UIA	ONE OF THE SECOND SECON
Signature		t a constituent de la company	Date:	Signature 50. MPC FINAL:	Commence of the Same was about the second	Date:
49. MPC COTR: Signature			Date:	Signature		Date:
Remarks:			20.75	Remarks:		PREVIOUS EDITIONS OBSOLETE
			CG FC	ORM 22		PREVIOUS EDITIONS OBSOLETE

Introduction

The Recommendation for Change of Publication (AF Form 847) is used to correct errors which affect the meaning of instructive information of procedures in all Coast Guard aircraft flight manuals (-1 series).

Availability of Form

The AF Form 847 can be obtained from your shop supervisor or the Quality Assurance (QA) office. If you have access to a Coast Guard standard work station, this form is available on the SAE Forms Plus Laser Library or on the Jet Form Filler on standard work station III.

Process

The aircrew member/mechanic who originates an AF Form 847 fills out a draft copy and submits it to the unit's QA office. The proposal is reviewed by QA personal for validity and technical accuracy. They then make necessary correction without changing the intended meaning of the original proposal. Using a CG standard work station, QA personnel transfer the information onto the computer version of the form and print out what becomes known as the original. You, the originator, will be asked to review this original to ensure it still says what you intended it to say.

Signatures

Once the originator and QA are in agreement, the AF Form 847 is signed by the originator and the QA Officer. It is then forwarded to the unit Engineering Officer for local approval.

Distribution

After the Engineering Officer approves the AF Form 847, it is returned to QA for submission to appropriate aircraft Prime Unit, Commandant (G-SAE), Commandant (OCA), and appropriate aircraft Standardization Unit. For distribution details refer to Aeronautical Engineering Maintenance Management Manual COMDINST M13020.1 (series)

AF Form 847 Block Entry Table

The following table contains remarks for the blocks that are required to be completed prior to submitting the AF Form 847 to the Quality Assurance Office. See example on the next page.

Block #		Entry/Remarks		
Date	Enter the date which	n you are submitting this form.		
Unit Number	Enter you units OPI	FAC Number.		
1	Enter the Publication	n Number.		
2	Enter the T.O.'s Ba	sic Date. Located on the cover page.		
3	Enter the Revision/	Change Date, located on the cover page.		
4	Enter the affected P	age Number you want changed.		
5	Enter the Major Par	Enter the Major Paragraph Title in this block, it will be in bold black lettering.		
6	Enter the Sub-Paragraph Title in this block if one applies.			
7	Enter the Item Number in this block.			
8	Enter whether you want to change or delete a paragraph, item or figure. State how it presently reads, and how you want it to read.			
9	Enter whether you want it to read.	wish to change or to delete a paragraph, item or figure. State how you		
10		are adding a new Paragraph, Sentence, Item or Figure. State how you s block is used in conjunction with block 9.		
11	Enter you reason for recommending a Change, Addition or Deletion. State any adverse operational effects that your change will correct if instituted.			
Organ- ization	Enter your units nar	ne and address.		
Name, Gi	rade and Signature	Self-explanatory		

Example of a Completed AF Form 847

The Following is a example of a completed AF Form 847 that was submitted by Aviation Technical Training Center.

Recommendat	Date	Unit Number				
	(Flight Publications) 17 M					
Publication Number (1)		vision/Change Date (3)	(Reserve	(d)		
C.G.T.O. 1C-130-1	1 January 1992	None				
Page Number (4) 1-75/76	Major Paragraph Title (5)	AC Power Distribution	n. 1500 Series.	Figure 1A-49		
Sub-Paragraph Title (6) LH AC Bus, Pilot's Upper Circuit Breaker Panels Item Number (7)						
(8) Change	Delete so much of	Paragraph 1	tem X Fi	дите		
As Reads Figure 1A-49 shows circu	iit breakers for the windshi	eld washer system.				
To Read Delete the reference to the	e windshield washer circuit	breakers.				
After Present (9)	Sentence	Item				
As Reads Add New (10) To Read	Paragraph	Sentence	Item	Figure		
CGTCTO HC130-930001 Therefore the reference to	d Change, Addition or Dele directs units with 1500 ser these circuit breakers need	ries C-130s to remove t				
Organization	ois and Sumula Courter Till	aboth Cir. NO 07000		···.		
	air and Supply Center, Eliz	aucui City NC. 2/909				
Type Name and Grade of Stan Lane AVTC	Originator	Signature Your Signature	gnature			
			 			

Introduction

Now that you have seen how an AF Form 847 is filled out, practice by completing the form on page 17 using the following scenario.

Scenario

You are stationed at Coast Guard Air Station Sacramento OPFAC #11-20290. You are reading the Omega Navigation System paragraph in CGTO 1C-130-1 flight manual. In the Search Mode Operation subparagraph on page 1-474, you notice that item #11 reads as follows:

FIRST TURN DIRECTION-ENTERED Press L for left turn or R for right turn.

Having just graduated from Basic Air Navigation School, you know the L or R for left or right turns cannot be entered without first pressing the R push button to blank out the right display, therefore the search cannot be used.

Your recommendation is to change item 11 to read as follows:

FIRST TURN DIRECTION-ENTERED Press the R push button to blank the right display, then press the R push button for right turn or L push button for left turn.

The basic date of CGTO 1C-130-1 is 6 November 1986.

AF Form 847 Practice Form

Complete the form below using the information in the practice scenario on the previous page.

Recommendat	ion For Change	Of Publication	Date	Unit Number
	(Flight Publicatio	ns)		
Publication Number (1)	Basic Date (2)	Revision/Change Date	(3)	Reserved)
Page Number (4)	Major Paragraph Title	(5)		
Sub-Paragraph Title (6)				Item Number (7)
(8) Change [Delete so much of	Paragraph [Item	Figure
As Reads				
To Read				
•				
After Present (9)	Sente	nce Item		
As Reads				
	Paragraph	Sentence	Item	Figure
To Read				
Reason For Recommended	l Change, Addition or l	Deletion (Include Adve	rse Operat	tional Effects) (11)
	g-,	(2.00.000.000	iso opeia.	Jonas Lyjeels) (11)
Organization				
Type Name and Grade of O	Originator	Signature		
				

Feedback

Your AF Form 847 should be completed as shown below. If there are errors, review the scenario and pages14 & 15. Correct any errors found.

Recommendat	Date Todays	Unit Number		
	(Flight Publications)			
Publication Number (1) CGTO 1C-130-1	Basic Date (2) 6 Nov. 1986	Revision/Change Date (3	(Reserv	ed)
Page Number (4) 1-474	Major Paragraph Title	e (5) Omega Navigation S	ystem (LTN-2)	11)
Sub-Paragraph Title (6)	Search Mode Operatio			11 mber (7)
(8) X Change	Delete so much of	Paragraph	Item F	igure
As Reads				
FIRST TURN DIRECTION		on D for might turn		
Using Push button, pr	ess L for left turn (or K for right turn.		
To Read				
FIRST TURN DIRECTIO				
Press the R push butte	on to blank the righ	it display, then press t	he R button	for right turn
or L for left turn.			•	
After Present (9)	Sente	ence Item		
As Reads				
Add New (10)	Paragraph [Sentence	Item	Figure
To Read				
Descon For Decommende				
Reason For Recommended	Change, Addition or	Deletion (Include Adverse	Operational E	ffects) (11)
L or R for left or right turn	cannot be entered with			
	cannot be entered with			
L or R for left or right turn	cannot be entered with			
L or R for left or right turn	cannot be entered with			
L or R for left or right turn	cannot be entered with			
L or R for left or right turn	cannot be entered with			
L or R for left or right turn display, therefore the search	cannot be entered with			
L or R for left or right turn display, therefore the search of the searc	a cannot be entered with the cannot be used.			
L or R for left or right turn display, therefore the search of the searc	a cannot be entered with the cannot be used.	hout first pressing the R p		

18

Questions

Answer the following question on the publication improvement system.

- 1. Which form would be used to request a change to an ACMS Maintenance Procedure Card?
- 2. Which form would be used to request a change to a Flight Manual?

5.A.04c Publication Improvement System Self-Quiz Feedback

Feedback

Compare you answers to the feedback provided below. If you had trouble with the Self-Quiz, please review the appropriate page of this reading assignment.

Question	Answers	Reference
1.	CG-22	5
2.	AF Form 847	13

Syllabus 5.A.04c

Performance

Submit a publication change request.

Performance Objective 1

Given a blank CG-22 form and a maintenance publication or a ACMS/MSR car containing incorrect information, **COMPLETE** the CG-22 form with the required information IAW the Aeronautical Engineering Maintenance Management Manual, COMDINST M13020.1 (series), and the CG-22 Process Guide, CGTO PG-85-00-20.

Performance Objective 2

Given a blank AF Form 847 and a flight manual containing incorrect information, **COMPLETE** the form with the required information IAW the Aeronautical Engineering Maintenance Management Manual, COMDINST M13020.1 (series).

5.A.04c Blank Page

Objectives

To successfully complete this assignment, you must study the text and master the following objectives:

- **SELECT** the correct manual used by the Coast Guard for the JOAP.
- **STATE** the purpose the JOAP.
- **STATE** the meaning of the term Spectrometric Oil Analysis.
- **DEFINE** the term Wear Metal.
- **STATE** the purpose of routine JOAP sample.
- **STATE** the purpose of special JOAP sample.
- **STATE** the warning associated with JOAP sampling methods.
- **STATE** the guidelines for taking JOAP samples.
- **IDENTIFY** the proper form for a DOD sponsored JOAP sample.
- **IDENTIFY** the manual used to fill out the DD Form 2026.
- **IDENTIFY** the proper form for the HU-25 SOAP sample.

References

The information in this assignment can be found in the following manuals.

- Joint Oil Analysis Program, NAVAIR 17-15-50.1
- Light Engine Maintenance Manual, 2J-ATF3-2-1
- Aeronautical Engineering Maintenance Management Manual, M13020.1 (series)

5.A.01 Overview

Introduction

The purpose of this assignment is to introduce you to the Joint Oil Analysis Program (JOAP). This assignment will also give you a basic understanding of the sample taking methods and the paperwork associated with the programs in Coast Guard aviation.

In This Assignment

This assignment contains the following:

Subject P	age
Joint Oil Analysis Program (JOAP)	3
JOAP Sampling Methods	5
JOAP Sampling Guidelines	7
JOAP Sampling Considerations	8
Sampling Documentation and Records	9
JOAP Self-Quiz	.12
JOAP Self-Quiz Feedback	.15
Syllabus	.17

Purpose of JOAP

The purpose of the Joint Oil Analysis Program (JOAP) is to combine and maintain a standard program that consolidates and coordinates the military force's oil analysis programs under one controlling regulation. This program allows all military units to share the laboratories closest to their command.

NAVAIR 17-15-50 (series)

The NAVAIR 17-15-50 (series) Joint Oil Analysis Program manuals are the primary directives used by the Coast Guard for involvement in the JOAP. These manuals tell the technician how to draw the sample and fill out the paper work associated with DOD sponsored aircraft.

Spectrometric Oil Analysis

Spectrometric Oil Analysis is the term use for the actual test used in determining the amounts of wear metal in lubricating fluids. Under this program aircraft engines, main gearboxes and hydraulic fluids are the types of equipment monitored. If the wear metal concentrations exceed the normal wear limits, the component can be removed or repaired before a major failure of the component occurs.

Wear Metals

Wear metals are particles of metals that are suspended in the lubricating fluid. These particles are caused by friction between two moving parts. Despite proper lubrication in an aircraft system wear continues as a normal mechanical process. Any fluctuations of the wear metal concentrations in the JOAP sample is a concern and should be investigated by the technician. The appropriate ACMS MPC or aircraft publications should be referenced for further decisive action.

Coast Guard Policy

The Joint Oil Analysis Program policy is that all Coast Guard aviation units must participate in the Joint Oil Analysis Program.

NOTE

History of the oil analysis program has clearly shown that the attitude of an operating activity towards the program is usually the decisive factor in its success.

Routine JOAP

A routine JOAP sample is a scheduled maintenance function that is tracked on the ACMS Maintenance Due List (MDL). The sample is done at a certain interval at a prescribed time decided by the component's manufacturer and/or the Coast Guard. The purpose of these routine samples is to continually monitor the condition of a component by averaging its wear rate and projecting the failure point. This allows the component to be removed prior to failing. It is important that the sample be drawn at the scheduled due time and sent to the lab in a timely manner.

Special JOAP Samples

The purpose of a special JOAP sample is to test the system oil after an incident or a condition that requires sampling out of the component's normally scheduled JOAP cycle. Some well known incidents and conditions are as follows.

- Engine or main gearbox overspeed
- Chip detector indication
- Magnetic drain plug accumulation
- Troubleshooting a component
- Excessive vibration
- Re-test request from the JOAP lab

4

• ACMS MPC requirements

Label For Special JOAP Samples

Special JOAP samples must be labeled to draw attention to the lab technician upon arrival. To do this you must color the JOAP sample bottle cap red, either by painting the cap or using a marking pen. This alerts the lab technician to process the sample immediately.

JOAP Sampling Methods

There are three methods for taking JOAP samples.

WARNING

Do not use mouth suction to fill a sampling tube. Many fluids are highly toxic and may cause paralysis and/or death.

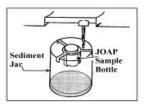
Dip Method

This method allows the technician to take the sample through the opening of the fluid reservoir by the use of a plastic tube. The oil is then transferred from the tube to the bottle.



Drain/Valve Method

This method allows the technician to attach a line to the reservoir and drain the oil into the sample bottle. When using this method you must allow the oil to drain for a specified amount of time (check ACMS MPC) into the sediment jar to ensure that the drain is clean of any entrapped dirt or moisture prior to placing the oil into a clean sample bottle.



Pump/Syringe Method

This method uses the suction of either a specially designed draw pump or a simple medical style syringe. The tubing is placed inside the filler neck or dip stick hole and suction is used to draw out the fluid. The fluid is then placed into a clean sample bottle. The syringe and tube are only to be used once and then discarded.

Reliable JOAP Sample

A reliable JOAP sample is one which is truly representative of the circulating fluid in the equipment being evaluated.

Guidelines

To take a proper JOAP sample you should follow some of the basic guidelines listed below:

- Take IAW the MPC for the applicable aircraft and/or system being tested.
- Use only clean test equipment.
- Use only bottles that are clean and sealed.
- Use lint free rags only.
- Ensure that the systems are at normal operating temperature.
- Fill the bottle to within ½ inch from the top.
- Use the sampling tubes/syringes only once (to prevent cross contamination).
- If something is dropped into the system, *do not* operate the system until the foreign object is removed.
- Close the system access after sampling to avoid contamination.
- Label bottles as soon as possible to avoid sample misidentification.
- Process forms in a timely manner.

Introduction

During the JOAP sample testing process, the technician should consider the following factors which affect the results of a JOAP sample analysis.

Normal Wear

Wear metal concentrations will gradually increase, the longer a piece of equipment stays in service.

Contamination

This is one of the most frequent problems reported by the test labs and is considered the weak link in the sampling process. This is cause by using dirty:

- Bottles
- Caps
- Tubes
- Syringes
- Rags

Break-in Period

The break-in period for newly installed or rebuilt components will have a higher concentration of wear metals. Caused by:

- New parts meshing with the old parts
- Machining irregularities
- Dirt from opening and closing the component's casings

Addition of Oil

Adding oil to the lubrication system can compromise the integrity of the sample if the information is not passed onto the lab. This can cause the PPM (parts per million) of wear metal concentrations to be lower than they actually are.

Sample Bottle Labeling

Each sample bottle must have a self-adhesive label which is normally manufactured locally. This label must contain the information shown on the example below.

Example

This is an example of a typical JOAP bottle self-adhesive label.

Aircraft #	Aircraft	Hours	_	
MGB Cold	#1 Eng	#2 Eng	Hot	

DD Form 2026

The DD Form 2026 Oil Analysis Request is used for all DOD sponsored aircraft. This form communicates to the JOAP lab all the pertinent information needed to accurately evaluate the sample. The instructions on how to fill out the DD Form 2026 is in the NAVAIR 17-15-50.1, Joint Oil Analysis Program manual.

HU-25 SOAP

The HU-25's ATF-3-6 engines use a SOAP (Spectrometric Oil Analysis Program) form. This form is provided by the manufacturer as part of the oil sample kit. This form is filled out IAW the instructions on the back of the SOAP form.

Example of a Completed DD Form 2026 JOAP Form This is an example of a completed DD Form 2026 JOAP form on a $\rm HH\textsc{-}65A$.

			SIS REQU			KEYPUNCH CODE
TO OIL	10/1/ ///// ////// ////////////////////					
MA.	MAJOR COMMAND CGAS BARBERS POUT					
O OPE	RATING ACT	VITY (Inch	de ZIP Code	/APO/DO	DAAD)	5-10
۳ '	3F/K-51 K2 /	UNI, M	7, 76	862		
EQUIP	MENT MODEL	/APPLICAT	ion W	168		11-14
EQUIP	MENT SERIAL	NUMBER	AG	C- 12	.3	15-20
END IT	EM MODEL/H	ULL NUMB	= 0	65K		
END IT	EM SERIAL N	UMBER/EN	D ITEM CO	DE 65	09	
DATE S	SAMPLE TAKE		, Yr) LOCA	AL TIME	SAMPLE	21-24
HOURS	MILES SINCE	OVERHAL)L	400		25-29
HOURS	MILES SINCE	OIL CHAN	GE	5		30-33
1	N FOR SAMPI	3 U <u>'</u>	EST OT	HER		34
OIL AD	DED SINCE L	AST SAMPL	E (Pts, Qts,	Gals)		35-36
ACTIO	N TAKEN		4 QTS.			
DISCR	EPANT ITEM					
ноw м	ALFUNCTION	ED			-	
HOW F		REQUEST	AIROF	RGROUN	D CREW	
HOW T	AKEN	SAMPLET	EMPERATI			37-38
	DRAIN D'TUBE D'HOT COLD REMARKS BASELINE REQUEST					
			BORATORY	USE ONI	.Υ	
SAMPL	E RESPONSE	TIME				39-40
FE 41-4	3 AG 44-46	AL 47-49	CR 50-52	CU 53-5	5 MG 56-58	NI 59-61
PB 62-6	4 SI 65-67	SN 68-70	TI 71-73	MO 74-7	6	
LAB RI	COMMENDA	TION		I.,		77-78
SAMPL	E NO.	SIGNATU	RE		FILE MAINT 79	DATA SEQ 80

DD FORM 2026 PREVIOUS EDITION WILL BE USED.

Example of HU-25 SOAP Form

Below is an example of a completed HU-25 SOAP form.



SO	4P		.,	NUMBER			ED R ANALYSIS PROGRA
Date Received		OIL TPE331	OIL SAMPLE SHIPPING FORM			F3	IMPORTANT
ENGINE	S/N 2 MODEL A			AIRCRA	FT	TYPE	MODEL HU. 25 A
							2800 09/17/97
Engine Hours Amount Of Oil							
Engine Hours	Since Last Cor	nplete Oil Cha	nge	400			
Oil Now In Use	e - Brand	MOBILE	- 254	Тур	e		
Did AlliedSigna	al Recommend	This Specific	Sampling?	Yes 🗆	No		
		A					
	M	AILING ADD	RESS FOR	R ANALYSI	S RE	SULT	S:
COMPANY	CGAS	MIAMI					
STREET							
							TATE <u>FL</u>
COUNTRY							CODE 33054
	•						W. S
TELEPHONE _							
TELEX OR FAX	NUMBER						
NOTES:	2. THIS SHE	ET MUST BE I	FILLED OUT	COMPLETE	ELÝ OF	R SAM	OUNT OF OIL ADDED. IPLE WILL NOT BE

SOAP Instructions On Back

Questions

Answer the following questions on the Joint Oil Analysis Program.

l. _	What manual is used by the Coast Guard as its primary directive for its involvement in the JOAP?
2.	State the purpose of the Joint Oil Analysis Program.
3.	Define the term Spectrometric Oil Analysis.
1.	Describe the term Wear Metal.
5.	What is the purpose of a routine JOAP sample?

Questions (continued)	6.	State the purpose of a special JOAP sample.
	7.	State the warning associated with taking a JOAP sample.
	8	State the guidelines for taking a JOAP sample.
	0.	a b c
		de
		hi

Continued next page

Questions (continued)

9. Match the form or manual in column A with its purpose in column B. Use each letter only once.

	Column A		Column B
1.	Allied Signal SOAP Form	a.	Instruction on how to fill out the DOD JOAP form
2.	NAVAIR 17-15-50.1	b.	The form used to communicate with the JOAP lab
3.	DD-Form 2026	c.	Form used for the ATF3-6 SOAP sample
		d.	ARSC Form ATF36/SOAP

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Feedback

Compare your answers to the feedback provided below. If you had trouble with the Self-Quiz, please review the appropriate section of this reading assignment.

Questions	Answers	Reference
1.	NAVAIR 17-15-50 (series) Joint Oil Analysis Program	3
2.	2. Is to combine and maintain a standard program that consolidates and, coordinates the military forces oil analysis programs under one controlling regulation.	
3.	The actual test used in determining the amount of wear metals in lubricating fluid.	3
4.	Particles of metals suspended in the lubrication fluid.	3
5.	Is a scheduled maintenance function that is tracked on the ACMS Maintenance Due List (MDL).	4
6. The purpose of a special JOAP sample is to test the system oil after an incident or a condition that requires sampling out of the component's normal scheduled JOAP cycle.		4
7.	Do not use mouth suction to fill a sampling tube. Many fluids are highly toxic and may cause paralysis and/or death.	5

Continued next page

Feedback (continued)

This is a continuation of the feedback table on the preceding page.

Question	Answer	Reference
8.	a. Take IAW the MPC's for the applicable aircraft and/or system being tested.	7
	b. Use only clean test equipment.	
	c. Only use bottles that are clean and that were sealed.	
	d. Use lint free rags only	
	e. Ensure that the systems are at normal operating temperature.	
	f. Fill the bottle to within ½ inch from the top.	
	g. Use the sampling tubes/syringes only once (to prevent cross contamination).	
	h. If something is dropped into the system, <i>do not</i> operate the system until the foreign object is removed.	
	i. Close the system access after sampling to avoid contamination.	
	 j. Label bottle as soon as possible to avoid sample misidentification. 	
	k. Process forms in a timely manner.	
9.	1. c 2. a 3. b	9

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Performance
Performance
Objective 1

Performance
Given a DD Form 2026, applicable aircraft data, and a
NAVAIR 17-15-50.1 Joint Oil Analysis Program manual,
PREPARE the DD Form 2026 IAW the NAVAIR 17-15-50.1.

Given an Allied Signal SOAP form, applicable aircraft data, and the instructions on the back of the SOAP form, PREPARE the Allied Signal SOAP form IAW the instructions on the back of the form.

5.A.01 Blank Page

Objectives

To successfully complete this assignment, you must study the text and master the following objectives:

- ? **DEFINE** the term inspection.
- ? **STATE** the purpose of aircraft inspections.
- ? **STATE** the two categories of aircraft inspections.
- ? **STATE** the manual that contains specific inspection requirements for each aircraft type.
- ? **DEFINE** the term routine inspection.
- ? **IDENTIFY** routine and special inspections.
- ? **STATE** the form used to schedule special inspections.

References

The information contained in this assignment can be found in the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series).

5.B.01c Overview

Introduction

This assignment introduces you to the different types of inspections performed on Coast Guard aircraft.

In This Assignment

In this assignment we will discuss the following topics:

Subject	Page
ntroduction to Aircraft Inspections	3
Routine Inspections	4
Preflight Inspection	5
Thruflight Inspection	6
Postflight Inspection	7
Hourly/Weekly Inspection	8
ACMS Scheduled Inspections	9
Special Inspections	10
Documenting Special Inspections	13
Aircraft Inspections Self-Quiz	17
Aircraft Inspections Self-Quiz Feedback	20
Syllabus	21

Introduction

The Coast Guard's Aviation Computerized Maintenance System (ACMS) includes all applicable inspection requirements for aircraft, ground support equipment, and special equipment. These inspections or tasks are completed and accounted for on an individual basis. This allows operational and maintenance flexibility with optimum use of staff-hours.

Definition of Inspections

Inspections, varying in scope, purpose, and frequency, are periodic or on-condition maintenance checks performed on assigned aircraft.

Purpose of Inspections

These inspections ensure that the aircraft are maintained in a safe, serviceable condition.

Inspection Categories

Inspections performed on US Coast Guard aircraft are grouped into the following categories:

- Routine
- Special

Inspection Criteria

For specific inspection requirements for each aircraft type, refer to the Aeronautical Engineering Maintenance Management manual, COMDTINST M13020.1 (series).

Definition

Routine inspections are maintenance checks that are accomplished on a regular or scheduled basis.

Inspections Considered to be Routine

The following inspections are considered to be of a routine nature:

- Preflight
- Thruflight
- Postflight
- Hourly/Weekly
- ACMS Maintenance Due List (MDL)

Purpose of a Preflight Inspection

The preflight inspection consists of checking the aircraft for flight preparedness by performing visual examinations and operational tests to discover defects and mal-adjustments which, if not corrected, could adversely affect safety of flight or mission accomplishment.

Preflight Inspection Characteristics

The Preflight Inspection consists of the following characteristics:

- Accomplished prior to the first flight of the day
- Remains effective for 24 hours provided no subsequent maintenance has been performed

Purpose of a Thruflight Inspection

The Thruflight Inspection is accomplished as a turn-around inspection on selected types of aircraft listed in the Aeronautical Engineering Maintenance Management manual, COMDTINST M13020.1 (series).

Thruflight Inspection Characteristics

The Thruflight Inspection consists of the following characteristics:

- Accomplished prior to take off on the second and each subsequent flight of the day
- Completion of a thruflight satisfies the requirements of a preflight. Therefore preflight certification can be documented on the CG-4377 Part I upon completion.

Purpose of a Postflight Inspection

The purpose of a postflight inspection is to ensure that the aircraft is suitable for continued flight.

Characteristics of a Postflight

- A postflight inspection consists of the following characteristics:
- Accomplished after the last flight of the flying period
- A visual inspection of certain components, systems, or areas, to ensure that no defects exist which would be detrimental to further flight
- Discloses defects requiring correction before deterioration into major maintenance items
- Inspection frequency ranges from once a day to once per week depending on the type of aircraft
- Performed on selected types of aircraft listed in the Aeronautical Engineering Maintenance Management manual, COMDTINST M13020.1 (series).

Purpose of an Hourly/Weekly Inspection

These inspections are designed to provide servicing and verification of satisfactory functioning of critical systems/components at frequent intervals.

Characteristics of an Hourly/Weekly Inspection

An Hourly/Weekly inspection consists of the following characteristics:

- Frequency of these types of inspections prohibits the use of the computer for scheduling
- Procedures for performing these inspections are located in the ACMS Maintenance Procedure Cards

Purpose of ACMS Scheduled Inspections

These inspections ensure that a thorough examination of all aircraft systems and components is accomplished on a scheduled basis.

Types of ACMS Scheduled Inspections

These inspections consist of the following types:

- Operations
- Calendar
- Hourly
- Cycles
- Landings

Characteristics of ACMS Scheduled Inspections

These inspections consist of the following characteristics:

- Procedures for performing these inspections are located in the ACMS Maintenance Procedure Cards
- Appear on the ACMS Maintenance Due List (MDL) for action

Definition

Special inspections are certain additional inspections, distinct in frequency from routine inspections, which are conditional upon operational environment, specific incidents, or other circumstances requiring inspections.

Examples of Special Inspections

The number of special inspections required for all aircraft and circumstances are too numerous to list. A few examples are given in the following items to illustrate their distinction from routine:

Overtemperature, Overspeed, Overtorque, Metal Contamination, Hard Landing, Lightning Strike Inspections,

(etc): These types of special inspections define the specific maintenance actions taken based upon the circumstances of the event. Procedures for performing these types of inspections have been written into existing manuals and the Aviation Computerized Maintenance System as the result of actual experiences or a high probability that the event will happen.

<u>Time Compliance Technical Order (TCTO)/Message Time</u>
<u>Compliance Technical Order (Message TCTO):</u> A TCTO is
normally generated by a reported safety-of-flight incident or failure
trend and is issued to perform inspections of an aircraft component or
system. TCTO's will appear on the ACMS Maintenance Due List
(MDL) report for action. A TCTO provides detailed information on
how to perform the inspection.

Aircraft Damage Sustained as a Result of a Mishap: The commanding officer will ensure that all damage sustained is properly inspected by competent maintenance personnel and that the complete extent of the damage is reported. This inspection should not be limited solely to the damaged area. A qualified maintenance officer should perform a complete evaluation prior to releasing the aircraft for flight.

Continued next page

Examples of Special Inspections (Continued)

Aircraft Damage Sustained as a Result of Flight Through

<u>Volcanic Ash:</u> Inadvertent flight through volcanic ash clouds is an infrequent but very real and significant hazard. Numerous commercial and military aircraft have sustained tremendous damage at jet airway altitudes hundreds of miles from active volcanoes. If flight through a volcanic ash cloud is known or suspected, contact Commandant (G-SEA) for decontamination procedures. Depot and Original Equipment Manufacturer (OEM) support will most likely be required.

Special Inspection Due to Maintenance: Some maintenance procedures require special inspections be performed as a follow up check. This inspection assures that the maintenance procedure was performed correctly and/or that the assembly or equipment is not defective.

Example: After installing the Main Rotor Head (MRH) on a HH-60J helicopter the MPC requires a torque check be performed on the MRH shaft nut bolts after 9-11 flight hours.

5.B.01c Blank Page

Introduction

The administrative process for documenting special inspections should be the same at all units but may vary slightly. Generally, you should document special inspections as outlined in the following tables.

Documenting a Special Inspection Due to a Specific Incident When an incident occurs that requires a special inspection, the following steps should be performed to document performance of the inspection.

Step	Action			
1	Write up the discrepancy describing the incident.			
	If	Then		
	the incident occurred during flight	write up the discrepancy on the CG-4377 Part III		
	the incident did not occur during flight	write up the discrepancy on the CG-4377B		
2	Perform the inspection in accordance with the applicable maintenance publication.			
3	Sign off the discrepancy written up in Step 1 and complete any applicable MPC's.			
4	Follow the appropriate instruction below depending on the outcome of the inspection.			
	the outcome of the inspec	1 0		
	If	1 0		
		tion.		

Continued next page

Scheduling a Special Inspection Due to Maintenance After installing the MRH on the HH-60J helicopter, a torque check is required to be performed every 10 flight hours until the torque stabilizes, or for a maximum of four times. This type of special inspection is scheduled on the CG-5181 in the Special Inspections/Services Record section as illustrated in the example on the following page (refer to the example while reading the table).

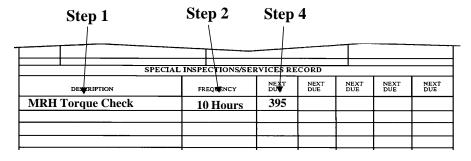
Special Inspection Step-Action Table

Schedule special inspections by performing the steps in the following table:

Step	Action				
1	Enter the description of the inspection (MRH Torque Check)				
2	Enter the frequency of the inspection (10 hours)				
3	Calculate the Next Due hours by performing the following steps:				
	Step Action				
	1 Round off the aircraft flight hours to the nearest whole number				
	2 Add 10 hours to the number from Step 1				
4	Enter the number from Step 3 in the first available Next Due block (from the left)				

Continued next page

Example of Scheduling a Special Inspection Due to Maintenance In the following example the aircraft had 384.5 flight hours at the time the MRH was installed. The number 384.5 is rounded up to 385 and then 10 hours is added to it, therefore 395 is entered in the Next Due block to schedule the inspection. Refer to the step-action table on the proceeding page.



Documenting
Performance of a
Special
Inspection Due to
Maintenance

When the inspection in the example above becomes due, the technician will perform the following steps to document performance of the inspection:

Step	Action			
1	Write up a discrepancy on the CG-4377B, requiring the inspection to be performed			
2	Perform the inspection in accordance with the applicable maintenance publication			
3	Document completion of the inspection by performing the applicable step below			
	If Then			
	the torque is stable	sign off the discrepancy written up in Step 1 and notify your supervisor		
	the torque is not stable	sign off the discrepancy written up in Step 1 and schedule another one by adding 10 hours to the total aircraft flight hours and enter that number in the next blank Next Due block on the CG-5181		

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Answer the following questions on aircraft inspections:

1.	What is the definition of an inspection?
2.	The purpose of aircraft inspections is to
3.	What two categories are aircraft inspections grouped into?
	ab
4.	Specific inspection requirements for each aircraft type can be found in what manual?
5	What is the definition of routine inspections?

Continued next page

Questions (Continued)

6. Match each inspection listed in column B to the appropriate type of inspection listed in column A. Use each letter only once.

	Column A	Column B
	,, 1. Routine Inspection	a. Hourly/Weekly
	,, 2. Special Inspection	b. Lightning Strike
		c. MRH Torque Check
		d. Postflight
		e. Preflight
		f. TCTO
7.	Which routine inspection is performed to the day?	pefore the first flight of
8.	On which ACMS report will TCTO's ap	opear for action?
9.	If a maintenance procedure requires a foinspection, it should be scheduled on the	

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Feedback

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	A periodic or on-condition maintenance check performed on assigned aircraft	3
2.	ensure the aircraft are maintained in a safe, serviceable condition	3
3.	a. Routine Inspectionsb. Special Inspections	3
4.	Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)	3
5.	Maintenance checks that are accomplished on a regular or scheduled basis.	4
6.	1. a, d, e 2. b, c, f	4 10, 11
7.	Preflight	5
8.	ACMS Maintenance Due List	10
9.	CG-5181	14

Syllabus 5.B.01c

Performance

PERFORM special inspections of aircraft and aviation equipment.

Performance Objective 1

Given the necessary equipment and publications, **PERFORM** special inspections of aircraft IAW the applicable publication.

NOTE

The number and types of special inspections are too numerous to provide a detailed reference list for each aircraft type. Instructions for performing special inspections are covered by the ACMS Maintenance Procedure Cards, the aircraft's maintenance publications, and issued Time Compliance Technical Orders (TCTO's).

Performance Objective 2

Given the necessary equipment and publications, **PERFORM** special inspections of aviation equipment IAW the applicable publication.

NOTE

The number and types of special inspections are too numerous to provide a detailed reference list for all aviation equipment. Instructions for performing special inspections are covered by the ACMS Maintenance Procedure Cards, the equipment maintenance publications, and issued Time Compliance Technical Orders (TCTO's).

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Objectives

To successfully complete this assignment, you must study the references and master the following objectives:

- **STATE** the purpose of a Time Compliance Technical Order (TCTO).
- **STATE** the organization that can authorize modifications of Coast Guard aircraft.
- **DEFINE** the Aviation Computerized Maintenance System (ACMS) reports that TCTO's appear on and the purpose.
- **DEFINE** the characteristics of TCTO's.
- **DEFINE** the characteristics of Special Compliance Technical Orders (SCTO's)

References

The information that you must study is contained in the following references:

- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)
- Aeronautical Engineering TCTO Process Guide, CGTO PG-85-00-40

5.B.02c Overview

Introduction	modifications to aircraft and aviation equipment.	
Notice to Student		
In This	This assignment contains the following:	
Assignment	Subject	Page
	How to Complete This Assignment	3
	Aircraft Modifications Self-Quiz	5
	Aircraft Modifications Self-Quiz Feedback	6
	Syllabus	7

Before You Begin

To complete this assignment, it is recommended that you do the following:

- Get permission from the reference custodian to use the documents
- Get a current copy of each of the references listed, usually from Quality Assurance
- Ensure that no pages in the references are missing or damaged
- DO NOT write in references or remove any pages
- Return the references to the custodian when you have finished the lesson

Continued next page

How to Proceed

To successfully complete this assignment, follow the steps listed below:

Step	Action	
1	Read the objectives on page 1	
2	Read and study the material in each reference listed below and ensure that you can fulfill each objective:	
	Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)	
	- Chapter 5, Directives and Publications, (Paragraph on TCTO's) Chapter 8 Aircraft Inspections (Section on Special	
	- Chapter 8, Aircraft Inspections, (Section on Special Inspections)	
	Aeronautical Engineering TCTO Process Guide, CGTO PG-85-00-40	
	Chapter 1, Coast Guard TCTO'sChapter 2, Coast Guard Message TCTO's	
	 Chapter 3, Contractor Produced Coast Guard TCTO's Chapter 4, TCTO Guidelines 	
	- Chapter 5, CG Special Compliance Technical Order's (SCTO), (TOPS 1)	
3	Take the self-quiz and review the feedback. If you have no trouble with the self-quiz, you should be well prepared for the pamphlet review quiz and the EOCT.	

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Answer the following questions on aircraft modifications:

1. What is the purpose of a Time Compliance Technical Order?

2. To track compliance of a TCTO, it will appear on which ACMS report?

3. Which digits in a TCTO number indicate the applicable ATA chapter?

4. Which Coast Guard organization can authorize modifications of aircraft?

5. What type of TCTO is used for rapid dissemination of information, generally of an urgent or safety-of-flight nature?

6. A Special Compliance Technical Order (SCTO) provides a means to implement aircraft, Mandatory Special Requirements (MSR), and Avionics Tracking System (ATS) changes which are not

____·

Feedback

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section in the applicable reference.

Question	Answer	Reference
1	A TCTO generally requires a physical change to an aircraft or a special inspection	COMDTINST M13020.1 (series) Page 5-3
2	Maintenance Due List (MDL)	COMDTINST M13020.1 (series) Page 5-4
3	Second and Third	COMDTINST M13020.1 (series) Page 5-4
4	Commandant (G-SEA)	COMDTINST M13020.1 (series) Page 5-4
5	Message TCTO	COMDTINST M13020.1 (series) Page 5-4
6	time sensitive	CGTO PG-85-00-40 Page 5-1

Syllabus 5.B.02c

Performance

PERFORM authorized modifications of aircraft and aviation equipment.

Precautions

You must be aware of the following caution and note before modifying aircraft or aviation equipment.

CAUTION

Only authorized modifications will be made on aircraft and aviation equipment. TCTO's can be authorized only by Commandant (G-SEA).

NOTE

TCTO's will be accomplished using standard aircraft maintenance practices and following the step-by-step procedures published in the TCTO.

Performance Objective 1

Given the necessary equipment, directions, and publications, **PERFORM** authorized modifications of aircraft IAW an issued TCTO and applicable publications.

Performance Objective 2

Given the necessary equipment, directions, and publications, **PERFORM** authorized modifications of aviation equipment IAW an issued TCTO and applicable publications.



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Objectives

To successfully complete this assignment, you must study the text and master the following objectives:

- **LIST** the six general troubleshooting guidelines in the proper order.
- **STATE** in writing the purpose of performing a visual inspection during the troubleshooting process.
- **STATE** in writing what you should do if unrelated discrepancies are found while troubleshooting.
- **STATE** in writing the purpose of performing an operational check during the troubleshooting process.
- **STATE** in writing what troubleshooting step includes verifying the suspect component.
- **LIST** a minimum of six of the common methods used to verify the condition of suspect components.
- **LIST** five of the more common types of corrective actions used to correct a malfunction.
- **STATE** in writing the purpose of conducting a final operational check during the troubleshooting process.

References

This assignment is original material designed and developed by the Subject Matter Specialists at AVTECHTRACEN and has no reference number or publication name.

5.B.GTG Overview

Introduction

This assignment is an introduction to the General Troubleshooting Guidelines that will assist you during the actual performance of the troubleshooting qualifications. Knowledge of these guidelines is essential to becoming a competent troubleshooter.

In This Assignment

This assignment contains the following:

Subject	Page
Five General Troubleshooting Steps	3
Step 1 - Visual Inspection	4
Step 2 - Operational Check	5
Step 3 – Classify the Malfunction	6
Step 4 - Isolate and Locate the Malfunction	7
Step 5 - Correct the Malfunction	9
Step 5 - Conduct Final Operational Check	10
General Troubleshooting Guidelines Self-Quiz	11
General Troubleshooting Guidelines Self-Quiz Feedback	14

Introduction

Troubleshooting is one of the most valued skills in the aviation workforce. There are standard time-proven steps used for troubleshooting aircraft systems. These steps are essential and apply to both mechanical and electrical systems.

Five General Troubleshooting Steps

The following table lists the five general troubleshooting steps that are used, in sequence, when troubleshooting aircraft systems.

Step	Action
1	Conduct a visual inspection of the malfunctioning system.
2	Perform an operational check of the malfunctioning system.
3	Classify the Malfunction.
4	Isolate and Locate the malfunctioning component/wire.
5	Correct the malfunction.
6	Conduct a final operational check of the repaired system.

Each of the six troubleshooting steps are listed in more detail on the following pages.

3

A visual inspection is performed to identify any obvious discrepancies that could be the actual cause of a malfunction, or to identify discrepancies that could possibly cause further damage to equipment or injury to personnel.

Visual Inspection Guidelines

The table below lists some of the more common guidelines that you should follow when performing a visual inspection:

If visually inspecting	Then check for
circuit protectors	tripped, overheating, security, cleanliness (corrosion), mechanical condition.
control switches	position, security, overheating, cleanliness (corrosion), mechanical condition.
equipment	security, cleanliness (corrosion), overheating, burnt odor, mechanical condition, missing parts (hardware).
mechanical linkages	binding, interference, distortion, excessive play, missing hardware, incorrect assembly.
wires	signs of overheating, security, chafing, cleanliness (corrosion), proper routing.
lines/connections	leaking (fluids, air, gases), security, routing.
reservoirs	proper fluid levels, correct fluid type, overheated fluid, leaks, proper configuration of valves, security of caps/plugs.

Unrelated Discrepancies

Unrelated discrepancies that are found during your visual inspection should be entered in the aircraft's logbook as a separate discrepancy.

An operational check of the malfunctioning system should be performed IAW applicable publications to gather as much additional information as possible about the current state of the system. This information will assist you in making logical decisions as you move through the General Troubleshooting steps.

Examples of Malfunction Indications

Listed below are some of the more common examples of malfunction indications that should be monitored and/or noted:

If the indication involves	Then check for
speed, temperature, or pressure	fluctuations, lack of indication, excessive or disproportional indications, etc.
sequence	number of cycles, completion, duration, etc.
illumination	intensity, lack of, flashing or flickering, etc.
abnormal current flow	dimming of lights, slowing of motors, overload warnings, overheated battery(s), chattering of relays, etc.
arcing/sparking	flashes, sounds of welding, burning odor, etc.
unusual noises	grinding, whining, scraping, rubbing, etc.
vibrations	vibrating controls (yoke, collective, cyclic, throttles), equipment, lines, cables, etc.

Unrelated Discrepancies

Unrelated discrepancies that are found during the operational check should be entered in the aircraft's logbook as a separate discrepancy.

Classify the Malfunction is the process of identifying the malfunction as either electrical or mechanical in reference to any findings in the previous steps.

Classification Examples

Listed Below are examples of malfunction classifications:

If classified as	Then it includes
Mechanical	Pumps, linkages, actuators, drives, valves, etc.
Electrical	Switches, sensors, wires, relays, motors, etc.

Referencing **Publications**

Classifying the malfunction enables you to reference the appropriate section of the applicable publication.

Isolate the Malfunction Description

Isolating the malfunction is the process of narrowing down from a list of possible components to a list of suspect components. This is done by eliminating all of the components/wires that are determined to be functioning normally during the Operational Check, (Step 2).

Locate the Malfunction Description

Locating the malfunction is done by physically locating the suspected malfunctioning component/wire and then performing a visual inspection on it, (Step 1).

Examples of Locating Methods

Listed below are examples of the different types of publications used to locate a component or wire, depending on aircraft type:

- Avionics Operation and Maintenance Manual
- Avionics System Maintenance Manual
- Fault Isolation Manual (FIM)
- General System (GS)
- Illustrated Parts Breakdown or Catalog (IPB) or (IPC)
- Job Guide Manual (JGM)
- Maintenance Manuals (MM)
- Maintenance Procedure Cards
- Maintenance Procedures Manual
- Overhaul Manual
- Principals Of Operation Manual
- Structural Repair Manual
- Testing And Troubleshooting Manual
- Wiring Diagram Manuals (WDM)

5.B.GTG Step 4 - Isolate and Locate the Malfunction (Continued)

Verifying Suspect Components

After you have compiled your list of suspect components and performed a visual inspection on each, verify their condition as either faulty or serviceable IAW the applicable publication.

Examples of Verifying Methods

Listed below are examples of some common methods used to verify the condition of components:

- Calibration checks
- Comparison checks (dual systems)
- Continuity checks
- Dimensional checks
- Elapsed time checks
- Megger checks (insulation breakdown)
- Pressure/Vacuum checks
- Rotational force checks
- Self tests
- Spring scale checks
- Temperature checks
- Tension checks
- Voltage checks

8

After the malfunctioning component/wire has been identified and verified as faulty, the malfunction should be corrected IAW the applicable publications.

Corrective Action

The applicable publication will guide you to the appropriate corrective action for the given malfunction, depending on your findings from Isolate and Locate, (Step 3).

Examples of Corrective Actions

Listed below are examples of some of the more common types of corrective actions used to correct a malfunction:

- Adjust
- Calibrate
- Repair
- Replace
- Re-set

The repaired system must be powered-up and operated to verify that the malfunction has been corrected IAW the applicable publications.

Final Operational Check Decision Table

The following table will help you decide whether you were successful at troubleshooting the applicable system:

If	Then
the repaired system is functioning normally IAW the applicable publication.	ensure ALL paperwork and aircraft logbook entries are complete.
the malfunction has NOT been corrected or a new discrepancy has been identified.	refer to Step 1 of the General Troubleshooting Guidelines.

Questions

1. List in order, the five general troubleshooting guidelines.
Step 1;
Step 2;
Step 3;
Step 4;
Step 5;
Step 6;
2. The purpose of performing a visual inspection during troubleshooting is to
, or to
3. If unrelated discrepancies are found while troubleshooting you should
4. The purpose for performing an operational check during troubleshooting the process is to
5. When you classify the malfunction, you are making the distinction between an or malfunction.
6. What troubleshooting step includes verifying the suspect components?

5.B.GTG General Troubleshooting Guidelines Self-Quiz (Continued)

Questions	
(Continued)	١

7.	List a minimum of six of the common methods used to verify the
COI	ndition of suspect components.

1.	 	
6.		

8. List five of the more common types of corrective actions used to correct a malfunction.

1.			
5			

9.	The purpose of conducting a final operational check during the
tro	ubleshooting process is to

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5.B.GTG General Troubleshooting Guidelines Self-Quiz Feedback

Feedback

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	Step 1; Conduct a visual inspection Step 2; Perform an operational check Step 3; Classify the malfunction Step 4; Isolate the malfunctioning component/wire Step 5; Correct the malfunction Step 6; Conduct a final operational check	3
2.	identify any obvious discrepancies that could be the actual cause, or to identify discrepancies that could possibly cause further damage to equipment or injury to personnel.	4
3.	enter the discrepancy in the aircraft's logbook.	4 or 5
4.	gather as much additional information as possible about the current state of the system	5
5.	Electrical or mechanical	6
6.	Isolate and Locate the malfunction.	8

General Troubleshooting Guidelines Self-Quiz Feedback (Continued)

Feedback (Continued)

The following is a continuation of the self-quiz feedback:

Question	Answer	Reference
7.	Any six of the following are acceptable:	8
	Calibration checks	
	Comparison checks (dual systems)	
	Continuity checks	
	Dimensional checks	
	Elapsed time checks	
	Megger checks (insulation breakdown)	
	Pressure/Vacuum checks	
	Rotational force checks	
	Self tests	
	Spring scale checks	
	Temperature checks	
	Tension checks	
	Voltage checks	
8.	Adjust	9
	Calibrate	
	Repair	
	Replace	
	Re-set	
9.	verify that the malfunction has been corrected	10
	IAW the applicable publications.	

For More Information

More detailed information about specific troubleshooting procedures may be found in the "Troubleshooting" section of the applicable aircraft maintenance publication. However, not all maintenance publications contain a troubleshooting section.

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5.B.01 **Syllabus Performance** TROUBLESHOOT hydraulic system discrepancies to the component/wire level. **Performance** Given a hydraulic system discrepancy and General Troubleshooting **Objective 1** Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG). **Performance** Given a hydraulic system discrepancy and necessary equipment, **Objective 2** PERFORM an operational check of the applicable system IAW one or more of the following references: **HH-65A** • 1H-65A-2-1, Chapter 29 • MPC Index, Chapter 29 **HH-60J** • A1-H60CA-450-300 • MPC Index, Chapter 29 HC-130H 1C-130H-2-29JG-00-1-1 1C-130H-2-29JG-00-1-2 • MPC Index, Chapter 29 **HU-25A** • 1U-25A-2, Chapter 29

• MPC Index, Chapter 29

1

Performance Objective 3

Given a hydraulic system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 4

Given a hydraulic system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 29
- 1H-65A-2-2, Chapter 29
- 1H-65A-4, Chapter 29
- MPC Index, Chapter 29

HH-60J

- A1-H60CA-450-200
- A1-H60CA-450-400
- A1-H60JA-WDM-000
- MPC Index, Chapter 29

Performance Objective 4 (continued)

HC-130H

- 1C-130H-2-29FI-00-1
- 1C-130H-2-29GS-00-1
- 1C-130H-2-13, Section 3
- 1C-130H-4, Section II
- MPC Index, Chapter 29

HU-25A

- 1U-25A-2, Chapter 29
- 1U-25A-2-9, Chapter 29
- 1U-25A-4, Chapter 29
- MPC Index, Chapter 29

Performance Objective 5

Given a hydraulic system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 29
- 1H-65A-2-2, Chapter 29
- MPC Index, Chapter 29

HH-60J

- A1-H60CA-450-200
- A1-H60CA-WCR-000
- MPC Index, Chapter 29

HC-130H

- 1C-130H-2-29JG-00-1-1
- 1C-130H-2-29JG-00-1-2
- MPC Index, Chapter 29

HU-25A

- 1U-25A-2, Chapter 29
- 1U-25A-2-9, Chapter 29
- MPC Index, Chapter 29

Performance Objective 6

Given a hydraulic system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A	
• 1H-65A-2-1, Chapter 29	
• MPC Index, Chapter 29	
НН-60Ј	
• A1-H60CA-450-300	
• MPC Index, Chapter 29	
НС-130Н	
• 1C-130H-2-29JG-00-1-1	
• 1C-130H-2-29JG-00-1-2	
HU-25A	
• 1U-25A-2, Chapter 29	
• MPC Index, Chapter 29	

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Syllabus 5.B.02

Performance	TROUBLESHOOT aircraft fuel system discrepancies to the component/wire level.	
Performance Objective 1	Given an aircraft fuel system discrepancy and General Troubleshooting Guidelines, PERFORM a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).	
Performance Objective 2	Given an aircraft fuel system discrepancy and necessary equipment, PERFORM an operational check of the applicable system IAW one or more of the following references:	
	HH-65A	
	• 1H-65A-2-1, Chapter 28	
	• 1H-65A-11-72-2B2	
	• MPC Index, Chapter 28	
	НН-60Ј	
	• A1-H60HA-460-200	
	• A1-T700-MMI-200	
	• MPC Index, Chapter 28	

• 1C-130H-2-28JG (series)

• MPC Index, Chapter 28

HU-25A

HC-130H

• 1U-25A-2, Chapter 28

• MPC Index, Chapter 28

Performance Objective 3

Given an aircraft fuel system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 4

Given an aircraft fuel system discrepancy and the necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 28
- 1H-65A-2-2, Chapter 28
- 1H-65A-4, Chapter 28
- MPC Index, Chapter28

HH-60J

- A1-H60HA-460-100
- A1-H60HA-460-300
- A1-H60HA-460-400
- A1-H60JA-WDM-000
- MPC Index, Chapter 28

Performance Objective 4 (Continued)

HC130H

- 1C-130H-4
- 1C-130H-2-13, Section 5
- 1C-130H-2-28FI (series)
- 1C-130H-2-28GS-00-1
- MPC Index, Chapter 28

HU-25A

- 1U-25A-2
- 1U-25A-4
- MPC Index, Chapter 28

Performance Objective 5

Given an aircraft fuel system discrepancy and the necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1
- 1H-65A-2-2
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 28

HH-60J

- A1-H60HA-460-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 28

HC-130H

- 1C-130H-2-28JG (series)
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 28

HU-25A

- 1U-25A-2
- 1U-25A-2-9
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 28

Performance Objective 6

Given an aircraft fuel system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

H	[H-65A	
•	1H-65A-2-1	
•	1H-65A-11-72-2B2	
•	MPC Index, Chapter 28	
H	[H-60J	<i>Ø</i>
•	A1-H60HA-460-200	
•	A1-T700-MMI-200	
•	MPC Index, Chapter 28	
H	ІС-130Н	<i>D</i>
•	1C-130H-2-28JG (series)	
•	MPC Index, Chapter 28	
H	IU-25A	<i>Ø</i>
•	1U-25A-2, Chapter 28	
•	MPC Index, Chapter 28	

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Syllabus 5.B.03

Given a discrepancy for an aircraft fuel quantity indicating system and the necessary equipment, CALIBRATE the fuel quantity indicating system IAW one or more of the following references: HH-65A • MPC Index, Chapter 28 HH-60J • A1-H60HA-460-300 • MPC Index, Chapter 28 HC-130H • 1C-130H-2-28JG-40-1 • MPC Index, Chapter 28	Performance	CALIBRATE fuel quantity indicating system.		
 MPC Index, Chapter 28 HH-60J A1-H60HA-460-300 MPC Index, Chapter 28 HC-130H 1C-130H-2-28JG-40-1 MPC Index, Chapter 28 		and the necessary equipment, CALIBRATE the fuel quantity		
HH-60J • A1-H60HA-460-300 • MPC Index, Chapter 28 HC-130H • 1C-130H-2-28JG-40-1 • MPC Index, Chapter 28		HH-65A		
 A1-H60HA-460-300 MPC Index, Chapter 28 HC-130H 1C-130H-2-28JG-40-1 MPC Index, Chapter 28 		• MPC Index, Chapter 28		
 MPC Index, Chapter 28 HC-130H 1C-130H-2-28JG-40-1 MPC Index, Chapter 28 		НН-60Ј		
HC-130H • 1C-130H-2-28JG-40-1 • MPC Index, Chapter 28		• A1-H60HA-460-300		
 1C-130H-2-28JG-40-1 MPC Index, Chapter 28 		• MPC Index, Chapter 28		
• MPC Index, Chapter 28		НС-130Н		
		• 1C-130H-2-28JG-40-1		
TITL 25A		• MPC Index, Chapter 28		
ПU-25A		HU-25A		

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• 1U-25A-2, Chapter 28

• MPC Index, Chapter 28

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Syllabus 5.B.04

Performance

RIG and ADJUST power controls, fuel selectors, and shut-off valve linkages.

Performance Objective

Given an engine power control, fuel selector, or shut-off valve rigging discrepancy and the necessary equipment, **RIG** and **ADJUST** the applicable system IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 76
- MPC Index, Chapters 28, 72, 73, and 76

HH-60J

- A1-H60CA-220-100
- A1-H60CA-220-200
- A1-H60CA-220-300
- MPC Index, Chapter 76

HC-130H

- 1C-130H-2-61JG-20-1
- 1C-130H-2-71JG-00-2
- 1C-130H-2-76JG-00-1
- 1C-130H-10
- MPC Index, Chapters 61, 71, 73, and 76

HU-25A

- 1U-25A-2, Chapters 73 and 76
- MPC Index, Chapters 71, 73, 75, and 76

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Syllabus 5.B.05

Performance

TROUBLESHOOT aircraft lubrication system discrepancies.

Performance Objective 1

Given an aircraft lubrication system discrepancy and the General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 2

Given an aircraft lubrication system discrepancy and necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references:

- 1H-65A-2-1, Chapters 63, 79
- 1H-65A-2-2, Chapters 63, 79
- MPC Index, Chapters 63, 79

HH-60J

- A1-H60CA-260-200
- MPC Index, Chapter 79

HC-130H

- 1C-130H-2-71JG-00-2
- 1C-130H-2-79JG-00-1
- MPC Index, Chapter 79

HU-25A

- 1U-25A-2, Chapter 79
- 2J-ATF3-2-1
- MPC Index, Chapter 79

Given an aircraft lubrication system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 4

Given an aircraft lubrication system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapters 63, 79
- 1H-65A-2-3, Chapters 63, 79
- 1H-65A-11-72-2B2
- 1H-65A-11-72-4B2
- MPC Index, Chapter s 63, 79

HH-60J

- A1-H60CA-220-100
- A1-H60CA-260-200
- A1-H60JA-WDM-000
- MPC Index Chapter 79

Performance Objective 4 (Continued)

HC-130H

- 1C-130H-2-70FI-00-1-2
- 1C-130H-2-13, Section 4
- 2J-T56-53
- 2J-T56-56
- 2J-T56-44
- MPC Index, Chapter 79

HU-25A

- 1U-25A-2, Chapter 79
- 1U-25A-4
- 2J-ATF3-2-1, Chapter 79
- MPC Index, Chapter 79

Given an aircraft lubrication system discrepancy and necessary equipment, CORRECT the malfunction IAW one or more of the following references:

HH-65A • 1H-65A-2-1, Chapters 63, 79

- 1H-65A-2-2, Chapters 63, 79
- 1H-65A-11-72-2B2
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapters 63, 79

HH-60J

- A1-H60CA-260-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapters 63, 79

HC-130H

- 1C-130H-2-79JG-00-1
- 2J-T56-53
- 2J-T56-56
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 79

HU-25A

- 1U-25A-2, Chapter 20
- 2J-ATF3-2-1
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 79

Given an aircraft lubrication system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A	
• 1H-65A-2-1, Chapters 63, 79	
• 1H-65A-11-72-2B2	
• MPC Index, Chapters 63, 79	
НН-60Ј	
• A1-H60CA-260-200	
• MPC Index, Chapter 79	
НС-130Н	
• 1C-130H-2-71JG-00-2	
• 1C-130H-2-79JG-00-1	
• MPC Index, Chapter 79	
HU-25A	
• 1U-25A-2, Chapter 79	
• 2J-ATF3-2-1	
• MPC Index, Chapter 79	

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Syllabus 5.B.06 **Performance** TROUBLESHOOT landing gear system discrepancies to the component/wire level. **Performance** Given an aircraft landing gear system discrepancy and General Troubleshooting Guidelines, PERFORM a visual inspection IAW **Objective 1** the General Troubleshooting Guidelines (section 5.B.GTG). Given an aircraft landing gear system discrepancy and necessary **Performance** equipment, **PERFORM** an operational check of the applicable **Objective 2** system IAW one or more of the following references: HH-65A • 1H-65A-2-1, Chapter 32 • MPC Index, Chapter 32 **HH-60J** • A1-H60HA-110-200 • MPC Index, Chapter 32 HC-130H • 1C-130H-2-32JG (series) • 1C-130H-2-32GS (series)

• MPC Index, Chapter 32

HU-25A

• 1U-25A-2, Chapter 32

• MPC Index, Chapter 32

Given an aircraft landing gear system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 4

Given an aircraft landing gear system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 32
- 1H-65A-2-3, Chapter 32
- 1H-65A-4, Chapter 32

HH-60J

- A1-H60HA-110-100
- A1-H60HA-110-200
- A1-H60JA-WDM-000
- MPC Index, Chapter 32

HC-130H

- 1C-130H-2-32FI-00-1-1
- 1C-130H-2-32FI-00-1-2
- 1C-130H-2-32JG-00-1
- 1C-130H-4
- MPC Index, Chapter 32

HU-25A

- 1U-25A-2, Chapter 32
- 1U-25A-2-9, Chapter 32
- MPC Index, Chapter 32

Given an aircraft landing gear system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 32
- 1H-65A-2-2, Chapter 32
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 32

HH-60J

- A1-H60HA-110-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 32

HC-130

- 1C-130H-2-32JG (series)
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 32

HU-25A

- 1U-25A-2, Chapter 32
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 32

Given an aircraft landing gear system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A		
•	1H-65A-2-1, Chapter 32	
•	MPC Index, Chapter 32	
H	H-60J	
•	A1-H60HA-110-200	
•	MPC Index, Chapter 32	
H	С-130Н	
•	1C-130H 2-32JG (series)	
•	1C-130H-2-32GS (series)	
•	MPC Index, Chapter 32	
H	U-25A	
•	1U-25A-2, Chapter 32	
•	MPC Index, Chapter 32	

Syllabus 5.B.07 **Performance** TROUBLESHOOT aircraft brake system discrepancies to the component/wire level. **Performance** Given an aircraft brake system discrepancy and General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW **Objective 1** the General Troubleshooting Guidelines (section 5.B.GTG). Given an aircraft brake system discrepancy and necessary **Performance** equipment, **PERFORM** an operational check of the applicable **Objective 2** system IAW one or more of the following references: HH-65A • 1H-65A-2-1, Chapter 32 • MPC Index, Chapter 32 **HH-60J** • A1-H60HA-110-200 • MPC Index, Chapter 32 HC-130H • 1C-130H-32JG (series) • 1C-130H-32GS (series) • MPC Index, Chapter 32 **HU-25A**

Continued next page

• 1U-25A-2, Chapter 32

• MPC Index, Chapter 32

Given an aircraft brake system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 4

Given an aircraft brake system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 32
- 1H-65A-2-2, Chapter 32
- 1H-65A-4, Chapter 32
- MPC Index, Chapter 32

HH-60J

- A1-H60HA-110-100
- A1-H60HA-110-200
- A1-H60JA-WDM-000
- MPC Index, Chapter 32

HC-130H

- 1C-130H-2-32FI (series)
- 1C-130H-2-32GS(series)
- 1C-130H-2-32JG(series)
- 1C-130H-4

HU-25A

- 1U-25A-2, Chapter 32
- 1U-25A-4, Chapter 32
- MPC Index, Chapter 32

Given an aircraft brake system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 32
- 1H-65A-2-2, Chapter 32
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 32

HH-60J

- A1-H60HA-110-300
- A-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 32

HC-130H

- 1C-130H-2-32GS (series)
- 1C-130H-2-32JG(series)
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 32

HU-25A

- 1U-25A-2, Chapter 32
- 1U-25A-2-9, Chapter 32
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 32

Given an aircraft brake system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A		
•	1H-65A-2-1, Chapter 32	
•	MPC Index, Chapter 32	
H	TH-60J	
•	A1-H60HA-110-200	
•	MPC Index, Chapter 32	
H	IC-130H	
•	1C-130H-32JG (series)	
•	1C-130H-32GS (series)	
•	MPC Index, Chapter 32	
H	IU-25A	
•	1U-25A-2, Chapter 32	
•	MPC Index, Chapter 32	

Syllabus 5.B.08

Performance

TROUBLESHOOT aircraft powerplant system discrepancies to the component/wire level.

Performance Objective 1

Given an aircraft powerplant system discrepancy and General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 2

Given an aircraft powerplant system discrepancy and necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapters 71 thru 80
- 1H-65A-11-72-2B2
- MPC Index, Chapters 70 thru 80

HH-60J

- A1-H60CA-220-200
- A1-T700A-MMI-200
- MPC Index, Chapters 71 thru 80

HC-130H

- 1C-130H-2-71JG-00-1 thru 80JG-00-1
- 2J-T56-53
- MPC Index, Chapters 71 thru 80

HU-25A

- 1U-25A-2, Chapters 71 thru 80
- 2J-ATF3-2-1
- MPC Index, Chapters 71 thru 80

Given an aircraft powerplant system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 4

Given an aircraft powerplant system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapters 71 thru 80
- 1H-65A-4, Chapters 71 thru 80
- 1H-65A-11-72-4B2
- MPC Index, Chapters 71 thru 80

HH-60J

- A1-T700A-MMI-200
- A1-H60CA-220-400
- A1-T700A-IPB-400
- A1-H60JA-WDM-000
- MPC Index, Chapters 71 thru 80

Performance Objective 4 (Continued)

HC-130H

- 1C-130H-2-70GS-00-1
- 1C-130H-2-70FI-00-1-1
- 1C-130H-2-70FI-00-1-2
- 1C-130H-2-70JG-00-1 thru 80JG-00-1
- 1C-130H-2-13, Section 4
- 2J-T56-44
- 2J-T56-53
- 2J-T56-56
- MPC Index, Chapters 71 thru 80

HU-25A

- 1U-25A-2, Chapters 71 thru 80
- 2J-ATF3-2-1
- MPC Index, Chapters 71 thru 80

Given an aircraft powerplant system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1
- 1H-65A-2-2
- 1H-65A-11-72-2B2
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapters 71 thru 80

HH-60J

- A1-T700A-MMI-200
- A1-H60CA-220-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapters 71 thru 80

HC-130H

- 1C-130H-2-70JG-00-1 thru 80JG-00-1
- 2J-T56-53
- 2J-T56-56
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapters 71 thru 80

HU-25A

- 1U-25A-2, Chapters 71 thru 80
- 1U-25A-2-9
- 2J-ATF3-2-1
- 2J-ATF3-2-2
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapters 71 thru 80

Given an aircraft powerplant system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A • 1H-65A-2-1, Chapters 71 thru 80 1H-65A-11-72-2B2 • MPC Index, Chapters 70 thru 80 **HH-60J** • A1-H60CA-220-200 • A1-T700A-MMI-200 • MPC Index, Chapters 71 thru 80 HC-130H • 1C-130H-2-71JG-00-1 thru 80JG-00-1 • 2J-T56-53 • MPC Index, Chapters 71 thru 80 **HU-25A** • 1U-25A-2, Chapters 71 thru 80 • 2J-ATF3-2-1 • MPC Index, Chapters 71 thru 80

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Syllabus 5.B.09

Performance

TROUBLESHOOT aircraft auxiliary power unit (APU) system discrepancies to the component/wire level.

Performance Objective 1

Given an aircraft auxiliary power unit discrepancy and General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 2

Given an aircraft auxiliary power unit discrepancy and necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references:

HH-65A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HH-60J

• A1-H60CA-240-200

НС-130Н

- 1C-130E-2-49JG-00-1-1
- 1C-130E-2-49JG-00-1-2
- 1C-130H-2-49JG-00-1-1
- 1C-130H-2-49JG-00-1-2
- MPC Index, Chapter 49

HU-25A

- 1U-25A-2, Chapter 49
- MPC Index, Chapter 49

Given an aircraft auxiliary power unit discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 4

Given an aircraft auxiliary power unit discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HH-60J

- A1-H60CA-240-200
- A1-H60CA-240-400
- A1-H60JA-WDM-000
- MPC Index, Chapter 49

Performance Objective 4 (Continued)

HC-130H

- 1C-130H-2-49GS-00-1
- 1C-130H-2-49JG-00-1-2
- 1C-130E-2-49JG-00-1-1
- 1C-130E-2-49JG-00-1-2
- 1C-130H-2-49FI-00-1
- 1C-130E-2-49FI-00-1
- 1C-130H-2-13, Section 4
- 1C-130H-4
- MPC Index, Chapter 49

HU-25A

- 1U-25A-2, Chapter 49
- 1U-25A-4, Chapter 49
- 1U-25A-2-9, Chapter 49
- MPC Index, Chapter 49

Given an aircraft auxiliary power unit discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HH-60J

- A1-H60CA-240-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 49

HC-130H

- 1C-130H-2-49JG-00-1-1
- 1C-130H-2-49JG-00-1-2
- 1C-130E-2-49JG-00-1-1
- 1C-130E-2-49JG-00-1-2
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 49

HU-25A

- 1U-25A-2, Chapter 49
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 49

Given an aircraft auxiliary power unit and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HH-60J

• A1-H60CA-240-200

HC-130H

- 1C-130E-2-49JG-00-1-1
- 1C-130E-2-49JG-00-1-2
- 1C-130H-2-49JG-00-1-1
- 1C-130H-2-49JG-00-1-2
- MPC Index, Chapter 49

HU-25A

- 1U-25A-2, Chapter 49
- MPC Index, Chapter 49

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Syllabus 5.B.10

Performance

TROUBLESHOOT aircraft pressurization system discrepancies to the component/wire level.

Performance Objective 1

Given an aircraft pressurization system discrepancy and General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 2

Given an aircraft pressurization system discrepancy and necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references:

HH-65A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HH-60J

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HC-130H

• 1C-130H-2-21JG-30-1

HU-25A

- 1U-25A-2, Chapter 21
- MPC Index, Chapter 21

Given an aircraft pressurization system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

_____&

Performance Objective 4

Given an aircraft pressurization system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HH-60J

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HC-130H

- 1C-130H-2-21GS-00-1
- 1C-130H-2-21FI-00-1-2
- 1C-130E-2-21JG-30-1
- 1C-130H-2-13, Section10
- 1C-130H-4
- MPC Index, Chapter 21

HU-25A

- 1U-25A-2, Chapter 21
- 1U-25A-4, Chapter 21
- 1U-25A-2-9, Chapter 21
- MPC Index, Chapter 21

Given an aircraft pressurization system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HH-60J

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HC-130H

- 1C-130H-2-21JG-30-1
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 21

HU-25A

- 1U-25A-2, Chapter 21
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 21

Given an aircraft pressurization system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HH-60J

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HC-130H

• 1C-130H-2-21JG-30-1

HU-25A

- 1U-25A-2, Chapter 21
- MPC Index, Chapter 21

Syllabus 5.B.11

Performance

TROUBLESHOOT aircraft air conditioning system discrepancies to the component/wire level.

Performance Objective 1

Given an aircraft air conditioning system discrepancy and General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 2

Given an aircraft air conditioning system discrepancy and necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 21
- MPC Index, Chapter 21

HH-60J

- A1-H60HA-410-200
- MPC Index, Chapter 21

HC-130H

- 1C-130H-2-21JG-00-1
- 1C-130H-2-21JG-10-1
- 1C-130H-2-21JG-20-1
- 1C-130H-2-21JG-40-1
- 1C-130H-2-21JG-50-1
- 1C-130H-2-21JG-50-2
- 1C-130H-2-21JG-60-1

HU-25A

- 1U-25A-2, Chapter 21
- MPC Index, Chapter 21

Given an aircraft air conditioning system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 4

Given an aircraft air conditioning system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 21
- 1H-65A-2-2, Chapter 21
- 1H-65A-4, Chapter 21
- MPC Index, Chapter 21

HH-60J

- A1-H60HA-410-100
- A1-H60HA-410-400
- A1-H60JA-WDM-000
- MPC Index, Chapter 21

Performance Objective 4 (Continued)

HC-130H

- 1C-130H-2-21GS-00-1
- 1C-130H-2-21FI-00-1-2
- 1C-130E-2-21JG-00-1
- 1C-130E-2-21JG-10-1
- 1C-130E-2-21JG-20-1
- 1C-130E-2-21JG-40-1
- 1C-130E-2-21JG-50-1
- 1C-130E-2-21JG-50-2
- 1C-130E-2-21JG-60-1
- 1C-130H-2-13, Section10

HU-25A

- 1U-25A-2, Chapter 21
- 1U-25A-4, Chapter 21
- 1U-25A-2-9, Chapter 21
- MPC Index, Chapter 21

Given an aircraft air conditioning system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 21
- 1H-65A-2-2, Chapter 21
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 21

HH-60J

- A1-H60HA-410-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 21

HC-130H

- 1C-130H-2-21JG-30-1
- 1C-130H-2-21JG-10-1
- 1C-130H-2-21JG-20-1
- 1C-130H-2-21JG-40-1
- 1C-130H-2-21JG-50-1
- 1C-130H-2-21JG-50-2
- 1C-130H-2-21JG-60-1
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 21

HU-25A

- 1U-25A-2, Chapter 21
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 21

Given an aircraft air conditioning system and necessary equipment, **PERFORM** an operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A		
•	1H-65A-2-1, Chapter 21	
•	MPC Index, Chapter 21	
H	H-60J	 A CONTRACTOR OF THE PARTY OF TH
•	A1-H60HA-410-200	
•	MPC Index, Chapter 21	
H	С-130Н	 A CONTRACTOR OF THE PARTY OF TH
•	1C-130H-2-21JG-00-1	
•	1C-130H-2-21JG-10-1	
•	1C-130H-2-21JG-20-1	
•	1C-130H-2-21JG-40-1	
•	1C-130H-2-21JG-50-1	
•	1C-130H-2-21JG-50-2	
•	1C-130H-2-21JG-60-1	
H	U-25A	
•	1U-25A-2, Chapter 21	
•	MPC Index, Chapter 21	

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Syllabus 5.B.12 **Performance** TROUBLESHOOT aircraft starter system discrepancies to the component/wire level. **Performance** Given an aircraft starter system discrepancy and General **Objective 1** Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG). Given an aircraft starter system discrepancy and necessary **Performance Objective 2** equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references: **HH-65A** • 1H-65A-2-1, Chapter 80 • MPC Index, Chapter 80 **HH-60J** • A1-H60CA-220-200 • MPC Index, Chapter 80 HC-130H • 1C-130H-2-80JG-00-1 • 1C-130H-2-71JG-00-1 **HU-25A** 1U-25A-2, Chapter 80

Continued next page

MPC Index, Chapter 80

Given an aircraft starter system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 4

Given an aircraft starter system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 80
- 1H-65A-2-2, Chapter 80
- 1H-65A-4, Chapter 80
- MPC Index, Chapter 80

HH-60J

- A1-H60CA-220-400
- A1-H60JA-WDM-000
- MPC Index, Chapter 80

HC-130H

- 1C-130E-2-70FI-00-1-1
- 1C-130E-2-80JG-00-1
- 1C-130H-2-13, Section 4
- MPC Index, Chapter 80

HU-25A

- 1U-25A-2, Chapter 80
- 1U-25A-4, Chapter 80
- 1U-25A-2-9, Chapter 80
- MPC Index, Chapter 80

Given an aircraft starter system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 80
- 1H-65A-2-2, Chapter 80
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 80

HH-60J

- A1-H60CA-220-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 80

HC-130H

- 1C-130H-2-80JG-00-1
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 80

HU-25A

- 1U-25A-2, Chapter 80
- 1U-25A-2-9, Chapter 80
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 80

Given an aircraft starter system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A	
• 1H-65A-2-1, Chapter 80	
MPC Index, Chapter 80	
НН-60Ј	
• A1-H60CA-220-200	
MPC Index, Chapter 80	
НС-130Н	
1C-130H-2-80JG-00-1	
1C-130H-2-71JG-00-1	
MPC Index, Chapter 80	
HU-25A	
• 1U-25A-2, Chapter 80	
MPC Index, Chapter 80	

Syllabus

5.B.13

Performance

TROUBLESHOOT ignition control system discrepancies to the component/wire level.

Performance Objective 1

Given an aircraft engine ignition control system discrepancy and General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 2

Given an aircraft engine ignition control system discrepancy and necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 74
- 1H-65A-11-72-2B2

HH-60.J

- A1-H60CA-220-200
- A1-T700A-MMI-200
- MPC Index, Chapter 74

HC-130H

- 1C-130H-2-71JG-00-1
- 2J-T56-56

HU-25A

- 1U-25A-2, Chapter 80
- 2J-ATF3-2-1, Chapter 74

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Given an aircraft engine ignition system discrepancy and your findings from your previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 4

Given an aircraft engine ignition control system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 74
- 1H-65A-2-2, Chapter 74
- 1H-65A-4
- 1H-65A-11-72-2B2
- 1H-65A-11-72-4B2
- MPC Index, Chapter 74

HH-60J

- A1-H60CA-220-400
- A1-H60JA-WDM-000
- A1-T700A-MMI-400
- MPC Index, Chapter 74

Performance Objective 4 (Continued)

HC-130H

- 1C-130H-2-80JG-00-1
- 1C-130H-2-13, Section 4
- 2J-T56-44
- 2J-T56-56
- MPC Index, Chapter 74

HU-25A

- 1U-25A-2, Chapter 80
- 1U-25A-2-9, Chapter 80
- 1U-25A-4
- 2J-ATF3-2-1, Chapter 74

Given an aircraft engine ignition control system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 74
- 1H-65A-2-2, Chapter 74
- 1H-65A-11-72-2B2
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 74

HH-60J

- A1-H60CA-220-200
- A1-H60CA-220-300
- A1-T700A-MMI-200
- A1-H60JA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 74

HC-130H

- 1C-130H-2-80JG-00-1
- 2J-T56-56
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 74

HU-25A

- 1U-25A-2, Chapter 80
- 2J-ATF3-2-1, Chapter 74
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 74

Given an aircraft engine ignition control system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A	
• 1H-65A-2-1, Chapter 74	
• 1H-65A-11-72-2B2	
НН-60Ј	
• A1-H60CA-220-200	
• A1-T700A-MMI-200	
• MPC Index, Chapter 74	
НС-130Н	
• 1C-130H-2-71JG-00-1	
• 2J-T56-56	
HU-25A	
• 1U-25A-2, Chapter 80	
• 2J-ATF3-2-1, Chapter 74	

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Syllabus 5.B.14 **Performance** TROUBLESHOOT aircraft flight control system discrepancies. **Performance** Given an aircraft flight control system discrepancy and General **Objective 1** Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG). **Performance** Given an aircraft flight control system discrepancy and necessary **Objective 2** equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references: HH-65A 1H-65A-2-1, Chapters 22 and 67 • 1H-65A-2-2, Chapters 22 and 67 • MPC Index, Chapters 22 and 67 **HH-60J** A1-H60CA-140-200 A1-H60HA-560-200 MPC Index, Chapters 22 and 67 HC-130H • 1C-130H-2-27JG (series) • MPC Index, Chapter 27 **HU-25A**

Continued next page

• 1U-25A-2, Chapters 27, 55, and 57

• MPC Index, Chapters 27, 55, and 57

Given an aircraft flight control system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 4

Given an aircraft flight control system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- H-65A-2-1, Chapters 22 and 67
- 1H-65A-2-2, Chapters 22 and 67
- 1H-65A-4, Chapters 22 and 67
- MPC Index, Chapters 22 and 67

HH-60J

- A1-H60HA-140-100
- A1-H60HA-140-400
- A1-H60HA-560-100
- A1-H60HA-560-400
- A1-H60JA-WDM-000
- MPC Index, Chapters 22 and 67

Performance Objective 4 (Continued)

HC-130H

- _____
- 1C-130H-2-27FI-00-1
- 1C-130H-2-27GS-00-1
- MPC Index, Chapter 27

HU-25A

- 1U-25A-2, Chapters 27, 55, and 57
- MPC Index, Chapters 27, 55, and 57

Given an aircraft flight control system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapters 22 and 67
- 1H-65A-2-2, Chapters 22 and 67
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 22 and 67

HH-60J

- A1-H60HA-140-300
- A1-H60HA-560-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 22 and 67

HC-130H

- 1C-130H-2-27JG (series)
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 27

HU-25A

- 1U-25A-2, Chapters 27, 55, and 57
- 1U-25A-2-9, Chapters 27, 55, and 57
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 27, 55, and 57

Given an aircraft flight control system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A 1H-65A-2-1, Chapters 22 and 67 1H-65A-2-2, Chapters 22 and 67 MPC Index, Chapters 22 and 67 HH-60J A1-H60CA-140-200 A1-H60HA-560-200 MPC Index, Chapters 22 and 67 HC-130H 1C-130H-2-27JG (series) MPC Index, Chapter 27 HU-25A 1U-25A-2, Chapters 27, 55, and 57 MPC Index, Chapters 27, 55, and 57

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Objectives

To successfully complete this assignment, you must study the text and master the following objectives:

- **LIST** the two general steps of rigging any aircraft.
- **SELECT** the definition of the named check from the list of possible definitions.
- WRITE the tools used for checking angles.
- **WRITE** the tool used to measure the installed tension of aircraft control cables.
- **WRITE** the tool used for rigging rotor-wing aircraft.
- **WRITE** the tool used for measuring linear distances for aircraft rigging applications.
- **STATE** the standard warning concerning aircraft flight controls with reference to an aircraft's hydraulic system.
- **STATE** the location where the Maintenance Flight Safety Warning (red tag) must be installed before performing aircraft rigging.
- **STATE** the publication which describes an appropriate functional check flight after aircraft rigging is performed.
- **STATE** the requirement that an aircraft must have to maintain a uniform flight path and recover from upsetting forces.
- **STATE** the warning every technician should be aware of before attempting a rig/range check.
- **STATE** the locations where rigging or range checks may not be performed.

References

The information contained in this lesson can be found in the following references:

- DOT Airframe and Powerplant Mechanics Airframe Handbook, AC65-15A
- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)

5.B.15 Overview

Introduction

The purpose of this assignment is to introduce you to the equipment and terminology used for rigging aircraft flight controls.

In This Assignment

This assignment contains the following:

Subject	Page
Rigging Checks for Aircraft	3
Rigging Equipment	4
Rigging Fixed-Wing Aircraft	8
Rigging Rotor-Wing Aircraft	9
Documenting Rigging Discrepancies	10
Rigging Principles	11
Rigging Guidelines	12
Flight Control Self-Quiz	14
Flight Control Self-Quiz Feedback	17
Syllabus	19

2

Flight control surfaces should move a certain distance in either direction from the neutral position. These movements must be synchronized with the movement of the cockpit controls. The flight control system must be adjusted (rigged) to obtain these requirements.

General Aircraft Rigging

General aircraft rigging consists of the following:

- Positioning the flight control system in neutral and temporarily locking it there with rig pins and blocks.
- Adjusting surface travel, system cable tension, linkages, and adjustable stops to specifications.

Definition of Range Checks

Range checks are a verification that the flight controls are properly rigged. If ranges do not fall into place, then special inspections and actions must be taken to correct the problem(s).

Definition of Rigging Checks

Rigging checks are performed to check the relative alignment and adjustment of an aircraft's main structural components, flight control surfaces, and flight control system. When rigging, follow specified maintenance publications for your aircraft type.

Definition of Clearance Checks

Clearance checks are performed to check the relative alignment of the flight controls to the aircraft structural stops. If rigging is completed and stops do not make specified clearance checks, follow specified maintenance procedures in the applicable publications for your aircraft type.

3

Special equipment is used to perform rigging on aircraft. The purpose of the illustrations on the next several pages is to give you an idea of what some rigging equipment looks like. Some equipment is different for fixed-wing and rotary-wing aircraft.

Rigging Equipment

There are too many types/pieces of equipment to be listed in this course, but in general the Coast Guard is currently using the following rigging equipment:

- Universal Propeller Protractor
- Tensiometer
- Vernier Scale
- Aircraft Rigging Kits
- Rigging Fixtures
- Scale

NOTE

Flight control rigging procedures are different for each aircraft type. Always refer to the applicable maintenance publications for specific procedures on your aircraft type.

Specific operating procedures for the flight control systems can be found in each aircraft's applicable maintenance manuals and maintenance procedure cards (MPC's).

Universal Propeller Protractor The Universal Propeller Protractor is used to check angles and measure surface travel in degrees during performance of rig/range checks.

Cable Tensiometer

The Cable Tensiometer is used to measure the installed tension of aircraft control cables.

Vernier Scale

The Vernier Scale is used to check angles during performance of rig/range checks for the HH-65A.

Illustration of a Vernier Scale

The Vernier Scale is described in the applicable maintenance manual. The maintenance manual explains how to properly use and read the scale when checking angles.

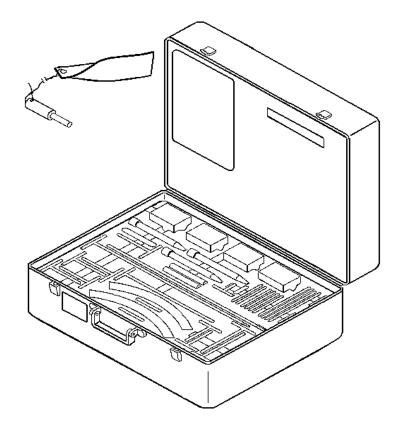


Aircraft Rigging Kit

The Aircraft Rigging Kit is used to perform rig/range checks on rotor-wing aircraft. This kit contains various pins, blocks, shims to lock the flight controls to preset angles for measurement purposes.

Illustration of an Aircraft Rigging Kit

The aircraft rigging kit is described in the applicable aircraft maintenance manual and MPC card. Use of the aircraft rigging kit is different for each type of aircraft, therefore the MPC thoroughly explains how to use it. The illustration below gives you a general idea of what the kit looks like.

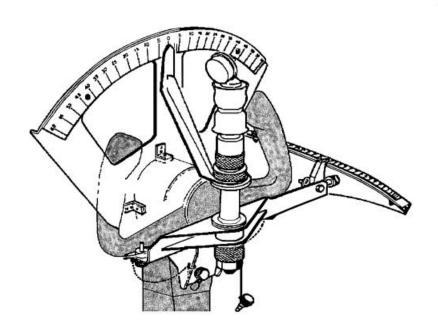


Rigging Fixtures

Rigging Fixtures are used on all Coast Guard aircraft. Rigging fixtures are set to the aircraft manufacturer's standards.

Illustration of a Rigging Fixture

The rigging fixture below is aircraft specific (HU-25). Use of the rigging fixture is explained in the aircraft MPC.



Scale

A Scale is used in measuring linear distance which requires minute measurements. A Scale may have measurements of one-sixteenth of an inch to one-hundredth of an inch.

Illustration of a Scale

The Scale below is actually the back face of the scale. The forward face of the scale contains measurements of one-sixteenth of an inch to one-thirty-second of an inch.



In order for a fixed-wing flight control surface to function properly, it must be correctly adjusted. Correctly rigged flight control surfaces will move through a surface-throw and be synchronized with the movement of the cockpit controls.

Standard Warning for Rigging

Before any work is performed on an aircraft for rigging discrepancies, follow the warning below:

WARNING

Do not apply hydraulic power with the flight control system pinned or disconnected. Failure to follow maintenance procedures could cause injury to personnel and/or damage to flight control systems and equipment.

Rigging of Fixed-Wing Flight Controls

Rigging any system requires that the step-by-step procedures be followed IAW the appropriate maintenance publications. Although the complete rigging procedure for most aircraft is of a detailed nature that requires several adjustments, the basic method follows three steps:

Step	Action		
1	Lock the cockpit control, bellcranks, and the control surfaces in the neutral position.		
2	Adjust the cable tension, maintaining the rudder, elevators, or ailerons in the neutral position.		
3	Adjust the control stops to limit the control surface travel to the dimensions given IAW maintenance publications for the aircraft being rigged.		

Rigging a rotor-wing aircraft (helicopter) coordinates movements of the flight controls and establishes the relationship between the main rotor and its controls and between the tail rotor and its controls.

Rigging Policy

Strict adherence to rigging procedures IAW applicable maintenance publications is critical. Adjustments, clearances and tolerances must be exact. Rigging requires great precision and attention to the minute detail.

Standard Warning for Rigging

Before any work is performed on an aircraft for rigging discrepancies, follow the warning below:

WARNING

Do not apply hydraulic power with the flight control system pinned or disconnected. Failure to follow maintenance procedures could cause injury to personnel and/or damage flight control systems and equipment.

Rigging of Rotor-Wing Flight Controls

Rigging of the flight control system can be broken down into several major steps:

Step	Action
1	Place control system in a particular position; holding the control system in position with pins, blocks or clamps.
2	Adjust the various linkages to fit the immobilized control component.
3	Place control surfaces in a specific reference position.
4	Use a rigging protractor assembly to check the angular difference between the control surface and some fixed surface on the aircraft.
5	Set the maximum range of travel of the various components. (This adjustment limits the physical movement of the control system.)

Aircraft rigging, as with any other maintenance performed on Coast Guard aircraft, must be annotated on the aircraft maintenance and/or history forms.

When to Document Rigging Discrepancies Before performing a rig/range task on a Coast Guard aircraft, ensure all maintenance started, in progress, and completed is written up in the appropriate aircraft maintenance forms.

Requirements

Due to the critical nature of flight control rigging, several Maintenance Requirements need to be followed:

Step	Action
1	Ensure rigging discrepancy is annotated on aircraft CG-4377 forms.
2	Circle aircraft DOWN STATUS on aircraft CG-4377 forms.
3	Ensure Maintenance Flight Safety Warning (red tag) is installed on cockpit controls before performing rigging/range checks.
4	Upon completion of all maintenance, annotate aircraft CG-4377 forms describing ALL maintenance accomplished.
5	Annotate appropriate functional check flight IAW COMDTINST M13020.1 (series).
6	Make appropriate SIGNIFICIANT COMPONENT HISTORT REPORT entry describing any deviation required that changed rigging, which would prevent installing rigging tools or new rigging calculations.
7	Record maintenance action by appropriate sign-off adding pertinent remarks.

An aircraft must have sufficient stability to maintain a uniform flight path and be able to recover from various upsetting forces. Also, to achieve the best performance, the aircraft must have the proper response to the movement of its flight controls.

General Warning for Rigging Discrepancies

Before performing any work on an aircraft for rigging discrepancies, follow the warning below:

WARNING

Do not simply adjust flight controls to correct discrepancies in a rigging/range check. Investigate and correct the reasons for aircraft going out of rig, before adjusting flight controls.

Rigging Principles

The following rigging principles must be observed:

- The rigging of flight controls and subsequent checks constitute a continuous sequence of operations which is very seldom carried out in full.
- Generally, only partial riggings or inspections are carried out in a defined operation which only affect the existing rigging.
- Rigging is required in case of removal/installation of the flight control system components.
- Flight control rigging consists of setting the flight controls into their relative positions to ensure a predetermined angle for each position of the flight control.

When performing any work on an aircraft for rigging discrepancies and/or general operational checks for flight control component replacement, several guidelines should be followed.

Warning

WARNING

To prevent damage to aircraft, ensure the maintenance procedure card is followed step-by-step. Each step leads into another step, which is a sequence that must be followed to attain the correct results or measurements.

Rigging Guidelines

The following guidelines should be observed:

- Rigging and other checks should not be performed outside of the maintenance hangar, unless Headquarters dictates it to be done in the open. If this cannot be avoided, the aircraft should be positioned with the nose in the wind.
- The weight and loading of the aircraft should be exactly as described in the aircraft log book. In all cases, the aircraft should not be jacked until it is ensured that the maximum jacking weight is not exceeded. Refer to COMDTINST M13020.1 (series).
- A rigging or range check should be completed before any work is performed on a flight control system. This will ensure you have a baseline, and will help you in deciding where to begin.
- When checking the range of movement of the flight control surface, the flight controls must be operated from the cockpit and not by moving the flight control surfaces.
- During the checking of flight control surface travel, ensure that push pull rods, cables, etc., have not reached limit of travel when the controls are against their respective stops.
- Where dual controls are installed, they must be synchronized and function satisfactorily when operated from both positions.
- When performing a rig/range check, the range of movement of the control surfaces should be checked in both directions.

Rigging Guidelines (Continued)

- After a system has been adjusted, the full and synchronized movement of the controls should be checked.
- If the flight control system is rigged correctly and functions properly, thoroughly inspect the flight control system to determine system is correctly assembled and that it will operate freely over the specified range of movement.
- Ensure all turnbuckles, rod ends, and attaching nuts and bolts are correctly safety-wired and/or secured.

Questions

	2)			
	Mate umn	• •	check	in column A with its definition in
	C	Column A		Column B
	1.	Clearance	a.	A verification that the flight controls properly rigged.
	2.	Range	b.	Performed to check the relative alignment of the flight controls to the aircraft structural stops.
	3.	Rigging	c.	Performed to check the tips of rotor blades are on the same tip path plane throughout their entire cycle of rotati
			d.	Performed to check the relative alignment and adjustment of an aircraft's main structural components flight control surfaces and flight control system.
•	Wha	at two rigging t	ools a	re used for checking angles?
	Who	t rigging tool i	e nead	to measure the installed tension of
		raft control cab		to measure the histalied tension of

Questions
(Continued)

•	Name the kit used to perform rig/range checks on rotor-wing aircraft.
•	What tool used in aircraft rigging measures from a one-sixteentl of an inch to a one-hundredth of an inch?
•	Write the warning concerning aircraft flight controls when hydraulic power is applied?
•	What location on the aircraft, should the Maintenance Flight Safety Warning (red tag) be installed before performing aircraft
	What is the Coast Guard publication that describes the
	What is the Coast Guard publication that describes the appropriate functional check flight after aircraft rigging is performed?

Questions (Continued)	10. What must an aircraft have to maintain a uniform flight path and recover from various upsetting forces?
	11. Write the warning you should be aware of before attempting a rig/range check.
	12. Where should rigging or range checks not be performed?

Feedback

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	Positioning the flight control system in neutral and temporarily locking it there with pins and blocks	3
	2) Adjusting surface travel, system cable tension, linkages, and adjustable stops to specifications	
2.	1) b	3
	2) a	
	3) d	
3.	Universal Propeller Protractor, Vernier Scale	5
4.	Cable Tensiometer	5
5.	Aircraft Rigging Kit	6
6.	Scale	7
7.	Do not apply hydraulic power with the flight control system pinned or disconnected. Failure to follow maintenance procedures could cause injury to personnel and/or damage to the flight control system and equipment	8

Self-Quiz Feedback (Continued)

The following is a continuation of the Self-Quiz feedback.

Question	Answer	Reference
8.	Ensure Maintenance Flight Safety Warning (red tag) is installed on aircraft cockpit controls	10
9.	COMDTINST M13020.1 (series)	10
10.	Sufficient stability	11
11.	Investigate and correct the reasons for aircraft going out of rig, before adjusting flight controls.	11
12.	Should not be performed outside of the maintenance hangar, unless Headquarters dictates it to be done in the open	12

Performance RIG and ADJUST flight controls. **Performance** Given a flight control discrepancy and the necessary equipment, RIG **Objective 1** flight controls IAW one or more of the following references: HH-65A • MPC Index, Chapter 67 **HH-60J** • MPC Index, Chapters 55 and 67 HC-130H • MPC Index, Chapter 27 **HU-25A** • MPC Index, Chapter 27 **Performance** Given a flight control discrepancy and the necessary equipment, Objective 2 ADJUST flight controls IAW one or more of the following references: HH-65A MPC Index, Chapter 67 **HH-60J** MPC Index, Chapters 55 and 67 HC-130H MPC Index, Chapter 27 **HU-25A** MPC Index, Chapter 27

Syllabus

5.B.15

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Syllabus 5.B.16

Performance

TROUBLESHOOT engine electrical/electronic control systems discrepancies.

Performance Objective 1

Given an aircraft engine electrical/electronic control system discrepancy and General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 2

Given an aircraft engine electrical/electronic control system discrepancy and necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references:

HH-65A

- ______P
- 1H-65A-2-1, Chapters 73 and 76
- MPC Index, Chapters 73 and 76

HH-60J

- A1-H60CA-220-200
- A1-H60HA-510-200
- A1-T700A-MMI-210

HC-130H

_____*M*

- 1C-130H-2-71JG-00-2
- 1C-130H-2-73JG-00-2
- 2J-T56-56
- MPC Index, Chapter 73

HU-25A

- 1U-25A-2, Chapters 71 and 73
- 2J-ATF3-2-1
- MPC Index, Chapters 71, 72, and 73

Given an aircraft engine electrical/electronic control system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 4

Given an aircraft engine electrical/electronic control system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapters 73 and 76
- 1H-65A-2-2, Chapters 73 and 76
- 1H-65A-4, Chapters 73 and 76
- MPC Index, Chapters 73 and 76

HH-60J

- A1-H60CA-220-200
- A1-H60CA-220-400
- A1-H60HA-510-200
- A1-H60HA-510-400

Performance Objective 4 (Continued)

HC-130H

- 1C-130H-2-70FI-00-1-1
- 1C-130H-2-70FI-00-1-2
- 1C-130H-2-71JG-00-2
- 1C-130H-2-73JG-00-2
- 1C-130H-2-13, Section 4
- 1C-130H-4
- 2J-T56-56
- MPC Index, Chapters 73 and 76

HU-25A

- 1U-25A-2, Chapters 71 and 73
- 1U-25A-2-9, Chapter 73
- 1U-25A-4
- 2J-ATF3-2-1
- MPC Index, Chapters 71, 72, and 73

Given an aircraft engine electrical/electronic control system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapters 73 and 76
- 1H-65A-2-2, Chapters 73 and 76
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 73 and 76

HH-60J

- A1-H60CA-220-300
- A1-H60HA-510-300
- A1-T700A-MMI-210
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 73 and 76

HC-130H

- 1C-130H-2-71JG-00-2
- 1C-130H-2-73JG-00-2
- 1C-130H-2-80JG-00-1
- 2J-T56-56
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 73 and 76

HU-25A

- 1U-25A-2, Chapters 71 and 73
- 2J-ATF3-2-1
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 71, 72, and 73

Given an aircraft engine electrical/electronic control system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

НН-65А		
•	1H-65A-2-1, Chapters 73 and 76	
•	MPC Index, Chapters 73 and 76	
H	Н-60Ј	
•	A1-H60CA-220-200	
•	A1-H60HA-510-200	
•	MPC Index, Chapter 72	
H	С-130Н	
•	1C-130H-2-71JG-00-2	
•	1C-130H-2-73JG-00-2	
•	2J-T56-56	
•	MPC Index, Chapter 73	
H	U-25A	
•	1U-25A-2, Chapters 71 and 73	
•	2J-ATF3-2-1	
•	MPC Index, Chapters 71, 72, and 73	

5.B.16 Blank Page

Syllabus 5.B.17 **Performance** TROUBLESHOOT aircraft engine anti-ice/de-ice system discrepancies to the component/wire level. **Performance** Given an aircraft engine anti-ice/de-ice system discrepancy and **Objective 1** General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG). **Performance** Given an aircraft engine anti-ice/de-ice system discrepancy and **Objective 2** necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references: HH-65A • 1H 65A-2-1, Chapters 71 and 76 • MPC Index, Chapters 30 and 75 HH-60.J A1-H60CA-220-200 A1-H60HA-410-200 A1-T700A-MMI-200, Chapter 17 • MPC Index, Chapters 30 and 75 HC-130H 1C-130H-2-30JG-00-1 • 1C-130H-2-71JG-00-1

HU-25A

• 1U-25A-2, Chapter 30

• MPC Index, Chapter 30

Given an aircraft engine anti-ice/de-ice system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 4

Given an aircraft engine anti-ice/de-ice system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H 65A-2-1, Chapters 71 and 76
- 1H-65A-11-72-2B2, Chapter 75

HH-60J

- ____
- A1-H60CA-220-400

A1-H60CA-220-100

- A1-H60HA-410-200
- A1-H60HA-410-400
- A1-H60JA-WDM-000
- A1-T700A-MMI-210
- A1-T700A-IPB-400

Performance Objective 4 (Continued)

HC-130H

- 1C-130H-2-30FI-00-1-1
- 1C-130H-2-30FI-00-1-2
- 1C-130H-2-30JG-00-1
- 1C-130H-2-75JG-00-1
- 1C-130H-4
- MPC Index, Chapter 75

HU-25A

- 1U-25A-2, Chapter 30
- 1U-25A-2-9, Chapters 30 and 71
- 1U-25A-4
- MPC Index, Chapter 30

Given an aircraft engine anti-ice/de-ice system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H 65A-2-1, Chapters 71 and 76
- 1H 65A-11-72-2B2, Chapter 75
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 30 and 75

HH-60J

- A1-H60CA-220-200
- A1-H60CA-220-300
- A1-H60HA-410-200
- A1-H60HA-410-300
- A1-T700A-MMI-200
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 30 and 75

HC-130H

- 1C-130H-2-30JG-00-1
- 1C-130H-2-75JG-00-1
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 75

HU-25A

- 1U-25A-2, Chapter 30
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 30

Given an aircraft engine anti-ice/de-ice system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

НН-65А	
• 1H 65A-2-1, Chapters 71 and 76	
 MPC Index, Chapters 30 and 75 	
НН-60Ј	
• A1-H60CA-220-200	
• A1-H60HA-410-200	
• A1-T700A-MMI-200, Chapter 17	
 MPC Index, Chapters 30 and 75 	
НС-130Н	
• 1C-130H-2-30JG-00-1	
• 1C-130H-2-71JG-00-1	
HU-25A	
• 1U-25A-2, Chapter 30	
• MPC Index, Chapter 30	

5.B.17 Blank Page

Syllabus 5.B.18 **Performance** TROUBLESHOOT aircraft windscreen anti-ice/de-ice system discrepancies to the component/wire level. **Performance** Given an aircraft windscreen anti-ice/de-ice system discrepancy and **Objective 1** General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG). **Performance** Given an aircraft windscreen anti-ice/de-ice system discrepancy and **Objective 2** necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references: HH-65A • 1H-65A-2-1, Chapter 30 • MPC Index, Chapter 30 HH-60.J A1-H60HA-410-200 • MPC Index, Chapter 30 HC-130H • 1C-130H-2-30JG-00-1 **HU-25A**

• 1U-25A-2, Chapter 30

Given an aircraft windscreen anti-ice/de-ice system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A • 1H-65A-2-1, Chapter 30 • 1H-65A-2-2, Chapter 30 • 1H-65A-4, Chapter 30 • MPC Index, Chapter 30 **HH-60J** • A1-H60HA-410-100 A1-H60HA-410-400 A1-H60JA-WDM-000 • MPC Index, Chapter 30 HC-130H 1C-130H-2-30FI-00-1-1 1C-130H-2-30JG-00-1 • 1C-130H-2-13, Section 10 • 1C-130H-4 • MPC Index, Chapter 30 **HU-25A** • 1U-25A-2, Chapter 30 1U-25A-2-9, Chapter 30 1U-25A-4 • MPC Index, Chapter 30

Given an aircraft windscreen anti-ice/de-ice system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 30
- 1H-65A-2-2, Chapter 30
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 30

HH-60J

- A1-H60HA-410-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 30

HC-130H

- 1C-130H-2-30JG-00-1
- 1C-130H-2-56JG-00-1
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 30

HU-25A

- 1U-25A-2, Chapter 30
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 30

Given an aircraft windscreen anti-ice/de-ice system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

H-65A	
1H-65A-2-1, Chapter 30	
MPC Index, Chapter 30	
Н-60Ј	
A1-H60HA-410-200	
MPC Index, Chapter 30	
С-130Н	
1C-130H-2-30JG-00-1	
U-25A	
1U-25A-2, Chapter 30	
	1H-65A-2-1, Chapter 30 MPC Index, Chapter 30 H-60J A1-H60HA-410-200 MPC Index, Chapter 30 C-130H 1C-130H-2-30JG-00-1 U-25A

Syllabus 5.B.19 Performance TROUBLESHOOT aircraft oxygen system discrepancies. **Performance** Given an aircraft oxygen system discrepancy and General **Objective 1** Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG). **Performance** Given an aircraft oxygen system discrepancy and necessary **Objective 2** equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references: HH-65A • This system/equipment not used on this aircraft

• Refer to the COMDTINST M1414.8, Chapter 2

HH-60J

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HC-130H

- 1C-130H-2-35JG-00-1
- MPC Index, Chapter 35

HU-25A

• 1U-25A-2, Chapter 35

Given an aircraft oxygen system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component IAW one or more of the following references:

HH-65A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HH-60J

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HC-130H

- 1C-130H-2-35FI-00-1
- 1C-130H-2-35GS-00-1
- 1C-130H-2-35JG-00-1
- 1C-130H-4
- MPC Index, Chapter 35

HU-25A

- 1U-25A-2, Chapter 35
- 1U-25A-4
- MPC Index, Chapter 35

Given an aircraft oxygen system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HH-60J

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HC-130H

- 1C-130H-2-35JG-00-1
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 35

HU-25A

- 1U-25A-2, Chapter 35
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 35

Given an aircraft oxygen system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HH-60J

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

H	С-130Н	
•	1C-130H-2-35JG-00-1	

• MPC Index, Chapter 35

HU-25A

• 1U-25A-2, Chapter 35

Objectives

To successfully complete this assignment, you must study the text and master the following objectives:

- **IDENTIFY** the manual used for compressed gas cylinder handling.
- **STATE** the identification criteria of a compressed gas cylinder which contains Aviation Breathing Oxygen.
- **STATE** the Oxygen Servicing Guidelines Warning.
- **DEFINE** the term asphyxia.
- **STATE** the identification criteria of a compressed gas cylinder which contains nitrogen.
- MATCH a list of definitions with a list of compressed gases.
- **MATCH** the components of a nitrogen pressure regulator to its function.
- **LIST** the nitrogen pressure regulators basic pre-use inspection guidelines.
- MATCH the components of a refrigeration manifold to its function.

References

The information contained in this assignment can be found in the following references:

- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)
- Gas Cylinders (Storage Type) Use, Handling, and Maintenance, AFTO 42B5-1-2
- DOT Airframe and Powerplant Mechanics Airframe Handbook, AC65-15A

5.B.20 Overview

Introduction

The purpose of this assignment is to introduce you to the safety concerns in the handling and operation of gaseous oxygen, nitrogen, and R-12 and 134A refrigerant servicing systems. This assignment will also give you an understanding of basic servicing principles of these systems.

In This Assignment

This assignment contains the following:

Compressed Gas Systems	Subject	Page
Oxygen Handling Guidelines	Compressed Gas Systems	3
Oxygen Handling Guidelines	Compressed Gas Cylinder Handling	4
Nitrogen Pressure Regulator	Oxygen	5
Nitrogen Pressure Regulator	Oxygen Handling Guidelines	6
Refrigerant-12 (R-12)	Nitrogen	7
Parts of a R-12 Refrigerant Manifold and Gage	Nitrogen Pressure Regulator	8
Refrigerant -134a (R-134a)	Refrigerant-12 (R-12)	10
Compressed Gas Use and Safety Self-Quiz	Parts of a R-12 Refrigerant Manifold and Gage	12
Compressed Gas Use and Safety Self-Quiz Feedback20	Refrigerant -134a (R-134a)	14
	Compressed Gas Use and Safety Self-Quiz	15
Syllabus23	Compressed Gas Use and Safety Self-Quiz Feedback	20
	Syllabus	23

Compressed Gas

There are four major compressed gas systems used in Coast Guard aviation today. They are as follows:

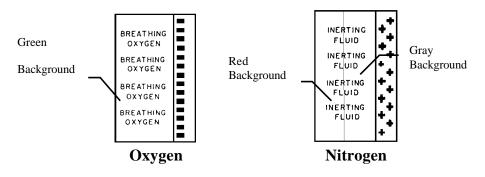
NOTE

Technicians should refer to a compressed gas by its proper name to avoid confusion on the hanger deck.

- Oxygen
- Nitrogen
- Refrigerant-12 (R-12)
- Refrigerant-134a (R-134a)

Compressed Gas Line Identification

Servicing connections and lines for compressed gas system on the aircraft are identified by colored tape known as Line Identification Tape. This tape is a multi-colored, self-adhesive tape with geometric symbols located on the side. The identification tape is required on both ends of a line or tube and at least once in each compartment the line passes through. The following is an example of oxygen and nitrogen labels.



3

Introduction

Gas cylinders require special handling due to their heavy weight, odd shape, and the fact that they are under high pressure. Cylinders are literally missiles waiting to go off; just waiting for the wrong careless moment of rough handling to release its high pressure. The best safety measure is to ensure that you, the cylinder handler, are adequately trained and that you follow both the manufacturers and the ACMS MPC.

Compressed Gas Handling Guidelines

There are some general compressed gas cylinder handling guidelines. However, it should not be assumed that every safety precaution is contained in this section. The primary manual used for compressed gas handling guidelines in Coast Guard aviation is AFTO 42B5-1-2; Gas Cylinders (Storage Type) Use, Handling, and Maintenance Manual. Below is a list of some basic guidelines.

- Read and understand the Material Safety Data Sheet (MSDS) for the compressed gas prior to use.
- Never drag or roll a cylinder.
- Never move cylinders, without first removing the regulator and manifold accessories and replacing the valve cap.
- When moving cylinders always use an approved cylinder truck with provisions to hold the cylinder securely.
- Never place a cylinder where it might come in contact with electrical circuits or store cylinders near live wires.
- Valve caps shall always be installed except when cylinders are connected to equipment.
- Never use compressed gas to dust off clothing.
- Never subject compressed gas cylinders to temperatures above 130°F.
- A distance of 50 feet or greater shall be maintained between cylinders and combustible material.
- When doing leak checks use only approved leak detection fluid (see ACMS MPC).

Oxygen 5.B.20

Definition of Oxygen

Oxygen is a colorless, odorless, and tasteless gas that makes up only 21% of the atmosphere. While oxygen itself is nonflammable, it gives intensive support to combustion.

Definition of Air

Air is a mixture of various elements consisting of oxygen (21%), nitrogen (78%), and other inert gases(1%). This total combination is known as air and shall be called air.

Oxygen Identification

The cylinder is green in color and has a white colored band painted around the circumference. The gaseous oxygen used in the Coast Guard is MIL-O-27214 Type I Grade B, Aviators Breathing Oxygen (ABO).

Oxygen Quality Requirement

The quality of oxygen that is used in aviation is very important. In aviation we use only 99.5% pure oxygen known as Aviators Breathing Oxygen (ABO) Type I, Grade B, MIL-O-27214. The reason for this strict compliance is to ensure that there is no water in the system which, at a high altitude or low temperatures, would cause the system to fail by freezing up.

Oxygen Safety Concerns

Oxygen safety is a major concern in the aviation maintenance field and care shall be exercised around gaseous oxygen at all times. The chemical reaction of fuel, gases, or oil combined with compressed oxygen is sufficient to develop spontaneous combustion, (requires no spark or flame) causing an explosion.

Oxygen Safety Guidelines

Avoid all contact with any products that contain hydrogen, oils, and greases such as:

- Petroleum products (engine oils, grease, petroleum based hand lotions, oil or grease on tools, etc.)
- Organic greases and oils (chap stick, vegetable oils, animal fats, chicken grease from your box lunch etc.)
- Synthetic distillates (hydraulic fluids, lubricating sprays)
- Hand tools, and maintenance equipment *shall* be clean and free from oil and grease before using oxygen equipment.

Oxygen Handling Guidelines

Below is a list of some basic oxygen servicing guidelines IAW the M13020.1 (series):

WARNING

During actual servicing the technician **SHALL** follow the ACMS MPC or aircraft maintenance publications to ascertain the proper equipment and servicing requirements needed for the specific aircraft being serviced.

- Never use oxygen from a cylinder without reducing the pressure through an oxygen regulator.
- Ground the aircraft to an approved ground prior to connecting oxygen servicing lines to aircraft.
- Before attempting to connect oxygen cylinders to aircraft systems *ensure* that each cylinder is correctly identified by a white band around the green cylinder or the words "Aviators Breathing Oxygen," painted on the side of the cylinder.
- Never deplete an oxygen bottle below 50 psi.
- Release all pressure from the lines before tightening or loosening any oxygen tubing or lines.
- Aircraft shall not be serviced with oxygen during fueling, defueling, or while other maintenance is being accomplished.
- Aircraft will not be serviced while in the hanger.
- When doing leak checks use only approved leak detection fluid (see ACMS MPC).

AMT2

Nitrogen 5.B.20

Definition of Nitrogen

Nitrogen is an inert gas. (Inert being defined as chemically inactive; not combining with other chemicals) and will not cause rust or decay of most things it comes into contact with. Nitrogen does not support combustion or life and is classified as an asphyxiant.

Definition of an Asphyxiant

An Asphyxiant is any chemical that causes asphyxia. Asphyxia is the deficiency of oxygen and excess build up of carbon dioxide in the blood, which can lead to unconsciousness or death.

Nitrogen Cylinder Identification

The gaseous nitrogen used in the Coast Guard follows these criteria:

- Cylinders are colored gray and have two black colored bands painted around the circumference.
- Must meet FED-SPEC-BB-N-411.
- Class I is an *oil free* nitrogen which means that it has been pumped into the cylinders by a water lubricated pump.

Uses of Nitrogen

Nitrogen, due to its inert and non corrosive characteristics, is used in many applications on aircraft such as:

- Tires
- Pneumatic struts
- Accumulators
- Landing gear emergency blow down bottles

Nitrogen Safety Guidelines

Below are some basic safety and handling guidelines that should be followed IAW NAVAIR 00-80T-96:

- Always use nitrogen in a well ventilated area or use supplemental breathing equipment.
- Never use nitrogen from a cylinder without reducing the pressure through a regulator.
- Do not use nitrogen carts for a source of pressure to run pneumatic tools. The tools can explode.

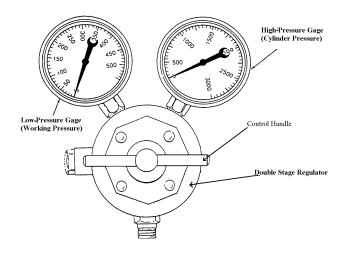
Nitrogen Pressure Regulator Function The nitrogen pressure regulator reduces and controls the pressure from the bottle or the servicing cart to the servicing connection. The nitrogen pressure regulator has three major parts.

Nitrogen
Pressure
Regulator Parts
Function Table

Below is a diagram listing the parts and the functions of a typical nitrogen pressure regulator and gage set.

Part	Function
High-Pressure Gage (Cylinder Pressure)	Indicates, in pounds per square inch (psi), the pressure of the gas in the cylinder.
Low-Pressure Gage (Working Pressure)	Indicates the pressure in the hose or line from the regulator to the servicing connection.
Double Stage Regulator and Control Handle	Provides the means for controlling the gas from the cylinder or servicing unit to the unit being serviced.

Nitrogen Pressure Regulator Diagram Below is a view of a typical compressed nitrogen gas cylinder pressure regulator with gages.



Basic Nitrogen Pressure Regulator/Gages

The nitrogen pressure regulator/gages have a basic pre-use inspection. Before using the pressure regulator/gages the technician should do the following inspection. This will ensure that the pressure regulator/gage are reasonably safe to use. The pressure regulator/gages are highly accurate and delicate instruments and should be handled with care.

Pre-Use Inspection Guidelines

Listed below are some of the more common and basic pre-use inspection guidelines.

- Gages are intact (no loose lenses).
- Gages are within calibration date.
- Gages are reading zero (not low or just above).
- Gages show no signs of damage (dents on the casing etc.)
- Regulator control handle moves freely with no roughness or binding.
- Regulators show no sign of corrosion.
- Regulators show no signs of leakage.
- Read the manual from the manufacturer or the applicable technical order.

R-12 Description

R-12 (DICHLORODIFLUOROMETHANE) is a fluorinated hydrocarbon refrigerant that is colorless, odorless, and non toxic. R-12 being heavier than air is also classified as an asphyxiant. R-12 boils at the low temperature of -26.6 F at sea level. Because of this, R-12, will cause immediate frostbite when exposed to any living tissue. R-12 is an ozone depleting chemical and is being replaced by R-134a.

R-12 Cylinder Identification

The R-12 refrigerant used in Coast Guard aviation comes in a 30-pound metal (BIB) tank and has no standard color coding.

R-12 Safety Guidelines

The following safety guidelines should be applied prior to and while using the R-12 refrigerant.

WARNING

Do not cross contaminate R-12 with R-134a system or its equipment. R-12 is not compatible with R-134a.

- Read and understand the Material Safety Data Sheet (MSDS) prior to use.
- Read and understand all ACMS MPC operating procedures of the servicing unit that your using.
- Always wear safety goggles (preferably a face shield).
- Always wear heavy work gloves.
- Ensure proper ventilation is maintained
- Ensure all aircraft power is secured.
- Ensure the pressure is released in the hose and tubing lines prior to making and breaking connections.
- When doing leak checks use only approved leak detection fluid (refer to the appropriate ACMS MPC).

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R-12 Refrigerant Manifold and Gage

The R-12 refrigerant manifold and gage normally come as a combined set as shown below. This set up is made for the maintenance and servicing of refrigerants only and should not be used with any other types of compressed gas set ups.

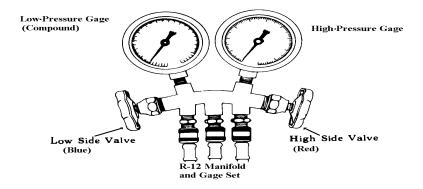
Manifold and Gage Parts Function Table

Below is a diagram listing the parts and function of the R-12 refrigerant manifold and gage set.

Parts	Function
Low-Pressure Gage (compound gage)	Reads low pressure or vacuum on either side of atmospheric pressure, 30 inches of mercury below atmospheric to 60 psi above atmospheric pressure.
High-Pressure Gage	Reads high-side pressure from 0 to 600 psi.
Refrigerant Manifold	Consists of three fittings used to connect the hoses and two colored hand valves.
Low-Pressure Side Valve (Blue)	Controls low pressure and vacuum (low side).
High-Pressure Side Valve (Red)	Controls high pressure (High side).

R-12 Refrigerant Manifold and Gage Diagram

Below is a diagram of a R-12 refrigerant manifold and gage set.



R-12 Manifold and Gage Set Handling Guidelines

The R-12 manifold and gage set is a highly accurate and delicate instrument. Before using the manifold and gage set, ensure the guidelines listed below are followed:

- Avoid dropping and mishandling the set.
- Always cap the lines after removing them from the refrigerant system (this avoids contaminating the gages and other refrigeration units).
- Ensure gages are within calibration date.
- Ensure gages show no sign of damage (dents on the casing, cracked lens, etc.).
- Ensure hoses are in good repair.
- Ensure valves move freely and shows no signs of binding.
- Never over tighten valves in the closed position.

R-134a Description

R-134a (tetraflouroethane) GENETRON® is a clear, colorless liquid, and at ambient temperatures is non-flammable. R-134a has a faint ethereal and sweetish odor and boils at the low temperature of -15°F at sea level. If R-134a is exposed to any living tissue, it will cause immediate frostbite. R-134a is heavier than air and is classified as an asphyxiant. Although R-134a is not an ozone depleting product, it is a greenhouse gas which contributes to global warming.

R-134a Cylinder Identification

The R-134a refrigerant that is used in Coast Guard aviation comes in a 30-pound metal (BIB) tank with no standard color coding.

R-134a Safety Guidelines

The following safety guidelines should be applied prior to and while using the R-134a refrigerant.

WARNING

Do not cross contaminate R-134a with a R-12 system or its equipment. R-134a is not compatible with R-12.

- The safety guidelines for R-134a are the same as previously stated for R-12.
- To prevent cross contamination, R-134a hoses have special end fittings on them. They are not to be modified to accept any other gas or hose assemblies.

R-134a Pressure Regulator

The R-134a pressure regulator is a part of the ROBINAIR 34700 servicing unit. Each operation is explained in the applicable ACMS MPC.

Questions

Fill in the correct answers for the following Compressed Gas Use and Safety questions.

1.	What manual is used in Coast Guard aviation for compressed gas cylinder handling guidelines?
2.	The Aviators Breathing Oxygen compressed gas cylinder is identified by what color scheme?
3.	During actual aircraft oxygen servicing, the technician shall follow the or
4.	The term asphyxia means:
5.	The nitrogen compressed gas cylinder is identified by what color scheme?

Questions (Continued)

6. Column A lists the definitions of various compressed gases. Column B lists the names of compressed gases. Look at the definitions of each compressed gas and match the correct definition to its name. You may use the names more than once.

<u>Column A</u>	Column B
1. Is a non-ozone depleting	a. Nitrogen
product, but is a greenhouse gas.	b. R-12
2. Is non-flammable, but	c. R-134a
will support combustion.	d. Oxygen
3. Makes up 21% of the	e. Air
atmosphere.	f. Argon
4. Is defined as chemically inert.	g. Carbon Dioxide
5. Is a combination of oxygen, nitrogen, and other gases.	

Questions (Continued)

7. Match each nitrogen pressure regulator component listed in column A with its purpose from column B. Use each letter only once.

Column A		Column B
1. Low-Pressure Gage2. High-Pressure Gage	a.	Provides a means for controlling the gas from the cylinder or servicing unit.
3. Double Stage Regulator	b.	Indicates in pounds per square inch (psi), the pressure of the gas in the cylinder.
	c.	Indicates the pressure in the hose or line from the regulator to the servicing connection.
	d.	Reads the compressed gas cylinders vacuum in inches of mercury (hg).

5.B.20 Compressed Gas Use and Safety Self-Quiz (Continued)

Questions
(continued)

Questions (Continued)

9. Match each Refrigerant Manifold and Gage component listed in column A with its purpose in column B. Use each letter only once.

Column A		Column B
1. Low-Pressure Side Valve	a.	Reads pressure from 0-600 psi.
2. Low-Pressure Gage (compound)	b.	Reads low pressure or vacuum.
	c.	Controls low pressure.
3. High-Pressure Gage	d.	Controls high pressure.
4. High-Pressure Side Valve	e.	Reads bottle weight.

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Feedback

Compare your answers to the feedback provided below. If you had trouble with the Self-Quiz, please review the appropriate section of this reading assignment.

Questions	Answer	Reference
1.	AFTO 42B5-1-2; Gas Cylinders (Storage Type) Use, and Handling, and Maintenance Manual	4
2.	Cylinders are colored green and have one white band around the circumference.	5
3.	ACMS MPC, aircraft maintenance publications	6
4.	Is the deficiency of oxygen and excess build up of carbon dioxide in the blood.	7
5.	Cylinders are colored gray and have two black bands around the circumference.	7
6.	1. c 2. d 3. d 4. a 5. e	13 5 5 7 5

Feedback (Continued)

This is a continuation of the feedback table on the preceding page.

Questions	Answers	Reference
7.	1. c 2. b 3. a	8
8.	a. Gages are within calibration date	9
	b. Gages are intact (no lose lens)	
	c. Gages are reading zero	
	d. Gages show no signs of damage	
	e. Regulator control handle moves freely with no roughness or binding	
	f. Regulators show no signs of corrosion	
	g. Regulators show no sign of leakage	
	h. Inspect hoses/lines for damage	
	i. Read and use the inspection manual from the manufacture or the applicable technical order	
9.	1. c 2. b 3. a 4. d	12

Syllabus 5.B.20

Performance

SERVICE aircraft oxygen system.

Performance Objective

Given an aircraft oxygen system and necessary equipment, **SERVICE** the applicable system IAW one or more of the following references:

HH-65A

- This system/equipment not used on this aircraft
- Refer to COMDTINST M1414.8, Chapter 2

HH-60J

- This system/equipment not used on this aircraft
- Refer to COMDTINST M1414.8, Chapter 2

HC-130H

- COMDTINST M13520.1
- 1C-130H-2-12JG-10-2
- MPC Index, Chapter 35

HU-25A

- COMDTINST M13520.1
- 1U-25A-2, Chapters 12, 20, and 35
- MPC Index, Chapter 35

5.B.20 Blank Page

5.B.21 **Syllabus Performance** TROUBLESHOOT aircraft fire extinguisher system discrepancies to the component/wire level. **Performance** Given an aircraft fire extinguisher system discrepancy and General **Objective 1** Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG). **Performance** Given an aircraft fire extinguisher system discrepancy and necessary **Objective 2** equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references: HH-65A • 1H-65A-2-1, Chapter 26 • MPC Index, Chapter 26 HH-60.J A1-H60CA-490-200 • MPC Index, Chapter 26 HC-130H • 1C-130H-2-26JG-20-1

• MPC Index, Chapter 26

• 1U-25A-2, Chapter 26

1

HU-25A

Given an aircraft fire extinguisher system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

_____*®*

Performance Objective 4

Given an aircraft fire extinguisher system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- ______
- 1H-65A-2-1, Chapter 26
- 1H-65A-2-2, Chapter 26
- 1H-65A-4, Chapter 26
- MPC Index, Chapter 26

HH-60J

- A1-H60CA-490-100
- A1-H60CA-490-400
- A1-H60JA-WDM-000
- MPC Index, Chapter 26

Performance Objective 4 (Continued)

HC-130H

- 1C-130H-2-26FI-00-1
- 1C-130H-2-26GS-00-1
- 1C-130H-2-26JG-20-1
- 1C-130H-2-13, Section 4
- 1C-130H-4
- MPC Index, Chapter 26

HU-25A

- 1U-25A-2, Chapter 26
- 1U-25A-2-9, Chapter 26
- 1U-25A-4
- MPC Index, Chapter 26

Given an aircraft fire extinguisher system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 26
- 1H-65A-2-2, Chapter 26
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 26

HH-60J

- A1-H60CA-490-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 26

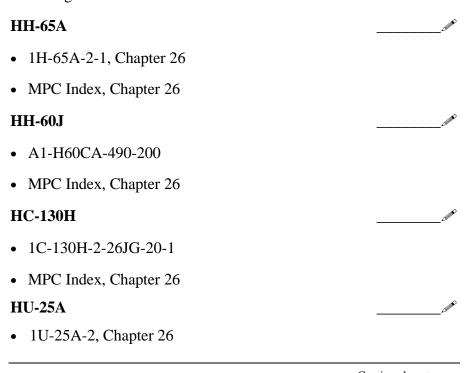
HC-130H

- 1C-130H-2-26JG-20-1
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 26

HU-25A

- 1U-25A-2, Chapter 26
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 26

Given an aircraft fire extinguisher system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:



5.B.21 Blank Page

5.B.22 **Syllabus Performance** TROUBLESHOOT aircraft fire detection system discrepancies to the component/wire level. **Performance** Given an aircraft fire detection system discrepancy and General **Objective 1** Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG). **Performance** Given an aircraft fire detection system discrepancy and necessary **Objective 2** equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references: HH-65A • 1H-65A-2-1, Chapter 26 • MPC Index, Chapter 26 HH-60.J A1-H60CA-490-200 • MPC Index, Chapter 26 HC-130H

• 1C-130H-2-26JG-10-1

• 1U-25A-2, Chapter 26

HU-25A

Given an aircraft fire detection system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Procedures (section 5.B.GTG).

Performance Objective 4

Given an aircraft fire detection system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 26
- 1H-65A-2-2, Chapter 26
- 1H-65A-4, Chapter 26
- MPC Index, Chapter 26

HH-60J

- A1-H60CA-490-100
- A1-H60CA-490-400
- A1-H60JA-WDM-000
- MPC index, Chapter 26

Performance Objective 4 (Continued)

HC-130H

- 1C-130H-2-26FI-00-1
- 1C-130H-2-26GS-00-1
- 1C-130H-2-13, Section 4
- 1C-130H-4
- MPC Index, Chapter 26

HU-25A

- 1U-25A-2, Chapter 26
- 1U-25A-2-9, Chapter 26
- 1U-25A-4
- MPC Index, Chapter 26

Given an aircraft fire detection system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 26
- 1H-65A-2-2, Chapter 26
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 26

HH-60J

- A1-H60CA-490-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 26

HC-130H

- 1C-130H-2-26JG-10-1
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 26

HU-25A

- 1U-25A-2, Chapter 26
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 26

Given an aircraft fire detection system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A	
• 1H-65A-2-1, Chapter 26	
• MPC Index, Chapter 26	
НН-60Ј	
• A1-H60CA-490-200	
• MPC Index, Chapter 26	
НС-130Н	
• 1C-130H-2-26JG-10-1	
HU-25A	
• 1U-25A-2, Chapter 26	

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Syllabus 5.B.23

Performance Objective

Performance

REPLACE cartridges and cartridge-activated devices.

Given a cartridge or a cartridge-activated device discrepancy and necessary equipment, **REPLACE** the applicable component IAW one or more of the following references:

HH-65A

- NAVAIR 11-100-1 (series)
- MPC Index, Chapters 25, 26, and 40

HH-60J

- A1-H60CA-GAI-000
- A1-H60CA-490-300
- A1-H60HA-110-300
- A1-H60HA-750-300
- NAVAIR 11-100-1 (series)
- MPC Index, Chapters 25, 26, 40, and 85

HC-130H

- 1C-130H-2-26JG-20-1
- NAVAIR 11-100-1 (series)
- MPC Index, Chapter 26

HU-25A

- 1U-25A-2, Chapter 26
- NAVAIR 11-100-1 (series)
- MPC Index, Chapter 26

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2

Syllabus 5.B.24

Performance

TROUBLESHOOT aircraft flotation system discrepancies to the component/wire level.

Performance Objective 1

Given an aircraft flotation system discrepancy and General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 2

Given an aircraft flotation system discrepancy and necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 25
- MPC Index, Chapter 25

HH-60J

- A1-H60CA-140-200
- A1-H60HA-560-200
- MPC Index, Chapters 22 and 67

HC-130H

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HU-25A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

Given an aircraft flotation system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 4

Given an aircraft flotation system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 25
- 1H-65A-2-2, Chapter 25
- 1H-65A-4, Chapter 25
- MPC Index, Chapter 25

HH-60J

- A1-H60HA-140-100
- A1-H60HA-140-400
- A1-H60HA-560-100
- A1-H60HA-560-400
- A1-H60JA-WDM-000
- MPC Index, Chapters 22 and 67

HC-130H

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HU-25A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

Given an aircraft flotation system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 25
- 1H-65A-2-2, Chapter 25
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 25

HH-60J

- A1-H60HA-140-300
- A1-H60HA-560-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapters 22 and 67

HC-130H

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HU-25A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

Given an aircraft flotation system and necessary equipment, **PERFORM** an operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 25
- MPC Index, Chapter 25

HH-60J

- A1-H60CA-140-200
- A1-H60HA-560-200
- MPC Index, Chapters 22 and 67

HC-130H

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HU-25A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

Syllabus 5.B.25

Performance

SERVICE aircraft flotation system.

Performance Objective

Given an aircraft flotation system and necessary equipment, **SERVICE** the system IAW one or more of the following references:

HH-65A

• MPC Index, Chapter 25

HH-60J

• A1-H60CA-GAI-000

HC-130H

- This system/equipment not used on this aircraft
- Refer to COMDTINST M1414.8, Chapter 2

HU-25A

- This system/equipment not used on this aircraft
- Refer to COMDTINST M1414.8, Chapter 2

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Syllabus 5.B.26

Performance

TROUBLESHOOT aircraft hoist system discrepancies to the component/wire level.

Performance Objective 1

Given an aircraft hoist system discrepancy and General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 2

Given an aircraft hoist system discrepancy and necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 40
- MPC Index, Chapter 40

HH-60J

- A1-H60CA-140-200
- A1-H60HA-560-200
- MPC Index, Chapters 22 and 67

HC-130H

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HU-25A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

Given an aircraft hoist system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 4

Given an aircraft hoist system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 40
- 1H-65A-2-2, Chapter 40
- 1H-65A-4, Chapter 40
- MPC Index, Chapter 40

HH-60J

- A1-H60HA-140-400
- A1-H60HA-560-400
- A1-H60JA-WDM-000
- MPC Index, Chapter 40

HC-130H

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HU-25A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

Given an aircraft hoist system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 40
- 1H-65A-2-2, Chapter 40
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 40

HH-60J

- A1-H60HA-140-300
- A1-H60HA-560-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapters 22 and 67

HC-130H

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HU-25A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

Given an aircraft hoist system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

- 1H-65A-2-1, Chapter 40
- MPC Index, Chapter 40

HH-60J

- A1-H60CA-140-200
- A1-H60HA-560-200
- MPC Index, Chapters 22 and 67

HC-130H

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HU-25A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

Airframe Seals 5.B.27

Objectives

To successfully complete this assignment, you must study the text and master the following objectives:

- **STATE** the two methods used to seal aircraft airframes.
- **LIST** the purposes for sealing aircraft airframes.
- STATE two forms mechanical seals are manufactured in.
- **IDENTIFY** the location of a mechanical seal in an illustration.
- **LIST** three types of rubber used in the manufacture of mechanical seals.
- **STATE** common locations mechanical seals are found on aircraft.
- **LIST** two procedures for application of mechanical seals.
- **STATE** the three basic types of sealants.
- **IDENTIFY** the location of airframe sealant in an illustration.
- **LIST** two procedures for applications of sealant.

References

The information contained in this assignment can be found in the following references:

- Structural Repair Instructions, AFTO 1C-130A-3
- Ground Handling, Servicing, and Airframe Maintenance, AFTO 1C-130H-2-2
- General Use of Cements, Sealants and Coatings, AFTO 42A3-1-2
- Aircraft Weapons Systems Cleaning and Corrosion Control, NAVAIR 01-1A-509 (AFTO 1-1-691)
- FAA Airframe Powerplant Mechanics General Handbook, AC65-9A

5.B.27 Overview

Introduction

This reading assignment is an introduction to airframe sealing methods.

In This Assignment

This assignment contains the following:

Airframe Sealing Methods	3
Mechanical Airframe Seals	4
Airframe Sealant	6
Airframe Sealing Self-Quiz	9
Airframe Sealing Self-Quiz Feedback	12
Syllabus	15

Introduction

Methods used to seal aircraft airframes vary depending upon the aircraft or component type. The sealing materials used will generally be the same, but the installation and application procedures can be quite different.

Methods of Sealing Airframes

The following methods are used to seal airframes:

- Mechanical seals
- Sealant

Purpose of Airframe Sealing

The purpose of airframe sealing is to accomplish the following:

- Prevent the entrance of dirt, water, air, and aircraft fluids which can lead to extensive corrosion.
- Prevent the loss of fluids, gases, or air.
- Absorb vibration, reduce noise, and cushion impact loads.

3

Introduction

Mechanical airframe seals are used on aircraft to maintain pressurization or for environmental protection.

Manufactured forms for Mechanical Seals

Mechanical seals are manufactured in two forms:

- Bulk (must be cut to size)
- Preformed (for an exact fit)

Types of Rubber

Mechanical seals are made from rubber. The term "rubber" is as all-inclusive as the term "metal." Types of rubber used to manufacture mechanical seals include:

- Natural
- Synthetic
- Silicone

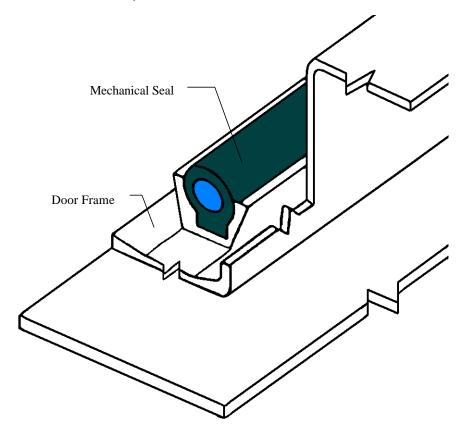
Mechanical Seal Locations

Mechanical seals are used on many different aircraft components to seal the airframe. Listed below are some of the most common locations:

- Doors
- Windows
- Panels

Mechanical Seal Illustration

The following illustration shows a mechanical seal application on a door frame cut-away.



Mechanical Sealing Procedures

Mechanical sealing procedures require *removing* and *installing* the seal. The methods and materials used to remove and install mechanical seals vary depending on aircraft type and component. Always refer to the applicable aircraft maintenance publication for detailed procedures.

Airframe Sealant

Airframe sealant is used to form a seal between two surfaces. The type of sealant used depends on the application.

NOTE

Airframe sealants and their applications are presented in "A" School and learned "on the job". Sealants are presented here to show their distinction from mechanical seals.

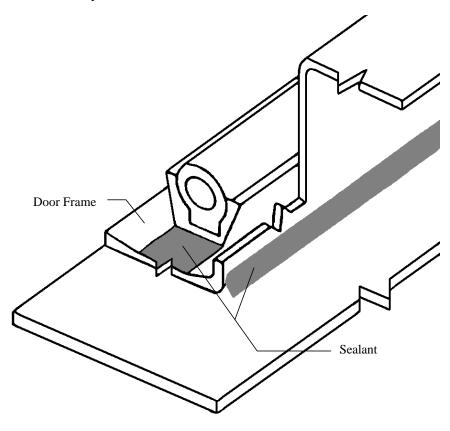
Basic Types of Sealant

There are three basic types of sealant:

- Pliable
- Drying
- Curing

Sealant Illustration

The following illustration shows a sealant application on a door frame cut-away.



Sealant Procedures

Sealant procedures require *removing* and *applying* sealant. The methods and materials used to apply sealants vary depending on aircraft type and component. Always refer to the applicable aircraft maintenance publication for detailed procedures.

More Reading References

Refer to the following references for more information on sealant and its application:

- General Use of Cements, Sealants and Coatings, AFTO 42A3-1-2
- Aircraft Weapons Systems Cleaning and Corrosion Control, NAVAIR 01-1A-509 (AFTO 1-1-691)

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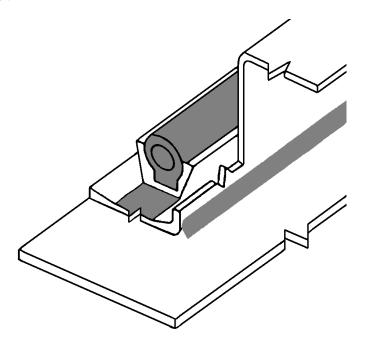
Questions

Answer the following questions on airframe seals:

1.	What are two methods used to seal airframes?
	1)2)
2.	List below the purposes for sealing airframes.
3.	Mechanical seals are manufactured in and
	forms.
4.	List below three types of rubber used to manufacture mechanical seals.
	1)
	2)
	3)
5.	List below common locations mechanical seals are found on aircraft.

Questions (Continued)

6. In the below illustration, draw a line that points to the mechanical seal.



- 7. Mechanical sealing procedures require _____ and ____ the seal.
- 8. List below the three basic types of sealants.

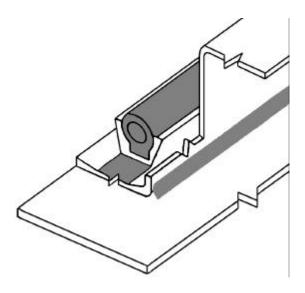
1)_____

2)

3)

Questions (Continued)

9. In the below illustration, draw lines that point to the areas that have sealant applied.



10. Sealant procedures require	 and
sealant.	

Feedback

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	1) Mechanical seals	3
	2) Sealant	
2.	Prevent entrance of dirt, water, air, and aircraft fluids which can lead to extensive corrosion.	3
	Prevent the loss of fluids, gases, or air.	
	Absorb vibration, reduce noise, and cushion impact loads	
3.	Bulk	4
	Preformed	
4.	1) Natural	4
	2) Synthetic	
	3) Silicone	
5.	Doors	5
	Windows	
	Panels	

Feedback (Continued)

The following is a continuation of the self-quiz feedback:

Question	Answer	Reference		
6.	Mechanical Seal	5		
7.	removing 5 installing			
8.	 Pliable Drying Curing 	6		
9.	Sealant	6		
10.	removing applying	7		

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Syllabus 5.B.27

Performance

REPLACE airframe seals.

Performance Objective 1

Given an airframe component requiring an airframe seal removal procedure, and necessary equipment, **REMOVE** the seal using one or more of the following references.

HH-65A

- MPC Index
- 1H-65A-2-1
- 1H-65A-3

HH-60J

- MPC Index
- A1-H60HA-110-300
- A1-H60HA-SRM-000

HC-130H

- MPC Index
- Job Guide T.O.'s
- 1C-130A-3

HU-25A

- MPC Index
- 1U-25A-2
- 1U-25A-3

Performance Objective 2

Given an airframe component requiring an airframe seal installation procedure, and necessary equipment, **INSTALL** the seal using one or more of the following references.

HH-65A • MPC Index • 1H-65A-2-1 • 1H-65A-3 **HH-60J** • MPC Index • A1-H60HA-110-300 • A1-H60HA-SRM-000 HC-130H • MPC Index • Job Guide T.O.'s • 1C-130A-3 **HU-25A** • MPC Index • 1U-25A-2 • 1U-25A-3

Syllabus 5.B.28

Performance

REPLACE panels in windshields, plastic enclosures, or windows.

Performance Objective

Given an aircraft and the necessary equipment, **REPLACE** a windshield, plastic enclosure, or window IAW one or more of the following references:

HH-65A

- ----
- 1H-65A-2-1, Chapter 52
- AFTO 1-1A-12
- MPC Index, Chapter 52

HH-60J

- A1-H60HA-110-300
- AFTO 1-1A-12
- MPC Index, Chapter 56

HC-130H

- 1C-130H-2-2
- 1C-130H-2-10
- AFTO 1-1A-12
- MPC Index, Chapter 56

HU-25A

- 1U-25A-2
- AFTO 1-1A-12
- MPC Index, Chapter 56

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2

Objectives

To successfully complete this assignment, you must study the text and master the following objectives:

- **MATCH** the methods of inspecting aircraft structural damage to their description.
- **MATCH** the classifications of aircraft structural damage to their description.
- **MATCH** the types of aircraft structural damage repair to their descriptions.
- MATCH internal aircraft structural components to their characteristics.
- MATCH sheet metal bend allowance terms with their definitions.
- **STATE** the two methods used to determine bend allowance.
- LABEL sheet metal bending layout illustrations with their terms.
- **STATE** the names of the bending equipment given bending equipment descriptions.
- **COMPLETE** statements pertaining to sheet metal bending steps.

References

The information contained in this assignment can be found in the following references:

- General Structural Repair, AFTO 1-1A-1
- Aviation Structural Mechanic S 3&2, NAVEDTRA 12338
- Air Force Extension Course, Airframe Repair Specialist, 53153 03 7704 Volume 2: Fundamentals of Metalworking
- Air Force Extension Course, Airframe Repair Specialist, 53153 03 7701 Volume 3: Fundamentals of Metalworking
- FAA Airframe & Powerplant Mechanics Airframe Handbook, AC65-15A

5.B.29 Overview

Introduction

One of the most important jobs the AMT will encounter is the repair of aircraft structural damage. All repairs must be of the highest quality and conform to the required specifications.

Using the Structural Repair Manual (SRM)

The procedures and materials needed for structural damage repair are given in the aircraft's Structural Repair Manual (SRM). It is important that the AMT becomes proficient in the use of this manual.

In This Assignment

This assignment contains the following:

Subject	Page
Types of Inspection for Aircraft Structural Damage	4
Classifications for Aircraft Structural Damage	6
Types of Aircraft Structural Damage Repair	9
Internal Repairs for Aircraft Structural Damage	10
Stringers and Their Repair	11
Spars and Their Repair	13
Ribs and Their Repair	14
Bulkheads and Their Repair	16
Longerons and Their Repair	17
Introduction to Sheet Metal Bending Brakes	18
Cornice Brake	19
Box and Pan Brake	20
General Working Guidelines for Bending Sheet Metal	21
Effects of Bending Sheet Metal	22
Bend Allowance Terminology	23

In This Assignment (Continued)

How to Use a Bend Allowance Chart	30
How to Use a Setback K-Chart	32
Bend Layout Scenario	34
Procedures for Bend Layout	35
Introduction to Job Aids for Bend Layout	39
Base Measurement Job Aid	40
Doubler Job Aid	43
Aircraft Structural Damage Repair Self-Quiz	46
Aircraft Structural Damage Repair Self-Quiz Feedback	52
Syllabus	55

Pre-inspection of Damaged Areas

When an aircraft structure has been damaged, the area must be prepared to ensure a thorough inspection can be done. Prior to inspection you must remove all of the following:

- Grease
- Dirt
- Protective coatings (paint, sealant, etc.)

Methods of Inspection

Three methods used to inspect aircraft structural damage are:

- Visual inspection
- Hardness testing
- Nondestructive inspection

Visual Inspection

A visual inspection will reveal any obvious damage that can be seen by the unaided eye. A boroscope is sometimes utilized to perform an internal visual inspection of a component.

The following table lists items to check for when performing a visual inspection:

Skin	 Dents Abrasions Distortion	 Scratches Breaks Punctures Buckles Cracks Wrinkles
Riveted/bolted joints	DamageLooseness	ShearedElongated holes
Secondary damage	Resulting from transmission of shock by the primary damage impact.	

For More Information

For more detailed information about visual inspections and borescopes refer to assignment 5.D.04, Inspection of Engine Internal Components assignment.

Types of Inspection for Aircraft Structural Damage (Continued) 5.B.29

Hardness Testing

A hardness test inspection determines if the metal has lost any strength characteristics caused by fire damage.

For More Information

For more detailed information about portable hardness test units refer to the Aerospace Metals - General Data And Usage Factors manual, AFTO 1-1A-9.

Nondestructive Inspection

Nondestructive inspections will reveal the full extent of any cracks that cannot be confirmed visually. Depending on the component, any one or more of the following nondestructive test methods may be applicable for the suspect damage area:

- Dye-penetrant
- Magnetic particle
- Eddy current
- Ultrasonic

For More Information

For more detailed information about nondestructive inspections refer to the following course assignments:

- Inspection of Engine Internal Components assignment, 5.D.04
- Assignment 5.D.01, Eddy Current NDI

Introduction

The aircraft SRM specifies the classifications of structural damage.

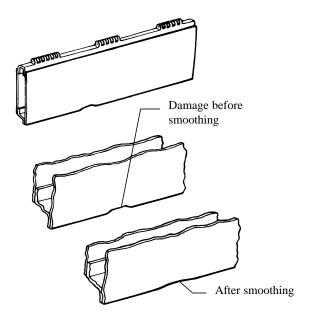
Damage Classifications

Aircraft structural damage can be classified under one of the following classifications:

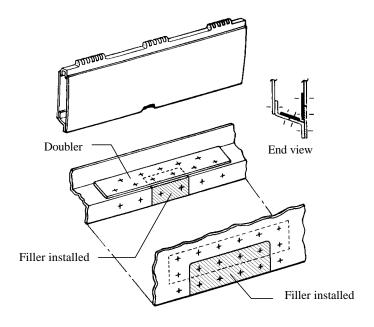
- Negligible damage
- Damage repairable by patching
- Damage repairable by insertion
- Damage necessitating replacement

Description and Illustration of Negligible Damage

Negligible damage is damage that can be permitted to exist or can be corrected by a simple procedure without placing a restriction on the flight status of the aircraft. This would include dent removal, stop-drilling cracks, and burnishing scratches or abrasions. See the illustration below.

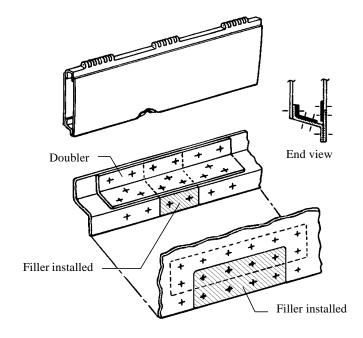


Description and Illustration of Damage Repairable By Patching Damage repairable by patching is damage that can be repaired by installing reinforcement to bridge the damaged portion of an area. See the illustration below.



Description and Illustration of Damage Repairable By Insertion

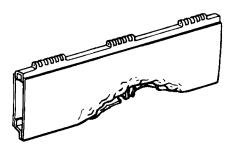
Damage repairable by insertion is damage which can be repaired to give original strength, by inserting a length of repair material of the same shape and characteristics. See the illustration below.

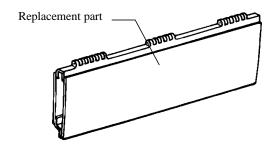


5.B.29 Classifications for aircraft Structural Damage (Continued)

Description and Illustration of Damage Necessitating Replacement

Damage necessitating replacement is damage which cannot be repaired by any practical means. See the illustration below.





Introduction

Determining the type of structural repair to perform is covered in the aircraft's SRM. But, factors can be involved which do not allow a smooth flow of procedures to accomplish the tasking.

Determining Factors for Repair

The type of structural repair to perform will depend on the:

- Material required (is it on hand?)
- Time available (do mission requirements result in any constraints?)
- Environmental restrictions (e.g., damage occurs away from base, so a temporary repair is applied until a permanent repair can be fabricated)

Types of Repair

The following table lists types of repairs and their descriptions:

Type of Repair	Description
Permanent	Restores the strength of the repaired structure equal to or greater than its original strength, and satisfies aerodynamic, thermal, and interchangeability requirements.
Temporary	Restores the load carrying ability of the structure but is not aerodynamically smooth or able to satisfy interchangeability requirements.
One-time flight	Restores a limited load-carrying ability to the damaged structure in order to fly the aircraft to a facility that can perform the necessary repair.

5.B.29

Internal Repairs for Aircraft Structural Damage

Introduction

The repair of internal structures concerns the repair or replacement of extruded parts used as stringers, webs used as bulkheads, and formed parts, such as ribs and formers.

Warning

Heed this warning when making internal repairs for aircraft structural damage:

WARNING

Before the removal, repair, or replacement of a structural member is undertaken, the adjacent structural members of the aircraft must be supported so that proper alignment is maintained throughout the operation.

Types of Internal Repairs

The following types of internal repairs will be shown in this assignment:

- Stringer
- Spar
- Rib
- Bulkhead
- Longeron

NOTE

The following repairs covered in this assignment have illustrations of a general nature. Always refer to the aircraft's SRM for specific repair procedures.

Definition

A stringer is a spanwise structural member designed to stiffen the skin and aid in maintaining the contour of the structure.

Characteristics

Stringers have the following characteristics:

- Transfer stresses from the skin to the bulkheads and ribs to which they are attached
- Are not continuous throughout the structure as are longerons and are not subject to as much stress
- In the form of C-channels, angle, or hat sections

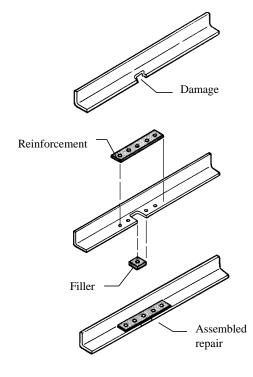
Methods of Stringer Repair

Stringers may be repaired by the following methods

- Patching (damage *not* exceeding two-thirds of one leg width)
- Patching (damage exceeding one leg width)
- Insertion

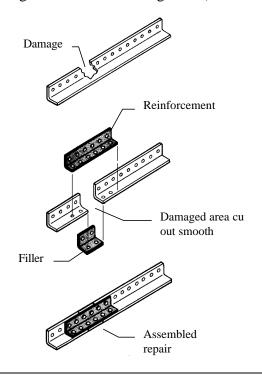
Stringer Patching Illustration

The following illustration shows a stringer repair by patching (damage not exceeding two-thirds of one leg width):



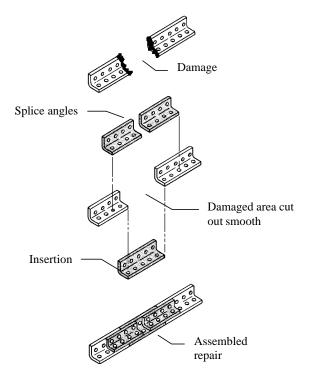
Stringer Patching Illustration

The following illustration shows a stringer repair by patching (damage exceeding two-thirds of one leg width):



Stringer Insertion Illustration

The following illustration shows a stringer repair by insertion:



Definition

Spars (also called beams) are the main spanwise member of the wing, stabilizers, and other airfoils.

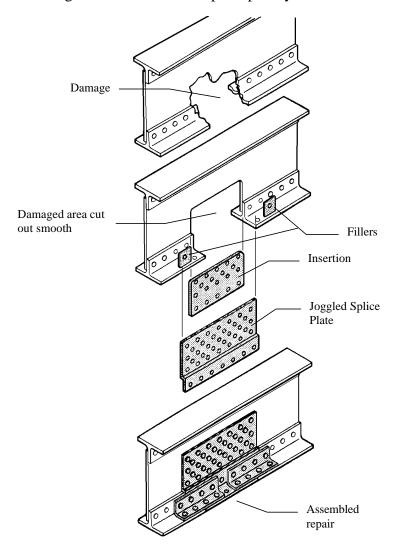
Characteristics

Spars have the following characteristics:

- Run the entire length of the airfoil
- Help absorb the bending loads imposed on the wing or other airfoil
- Are very highly stressed

Spar Repair Illustration

The following illustration shows a spar repair by insertion:



Definition

Ribs are the principal chordwise members in the wings, stabilizers, and other airfoils.

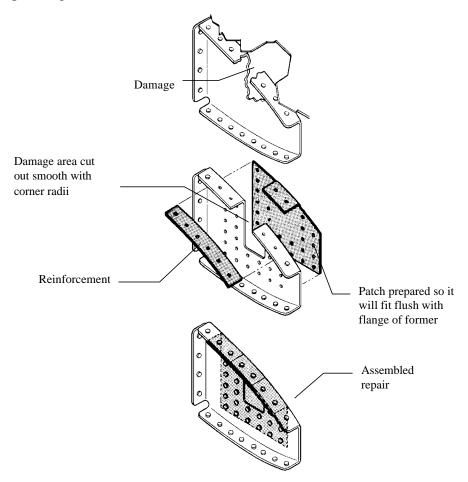
Characteristics

Ribs have the following characteristics:

- Serve as formers for the airfoil
- Give the airfoil shape and rigidity
- Transmit stresses from the skin to the spars
- Resist compression and shear loads

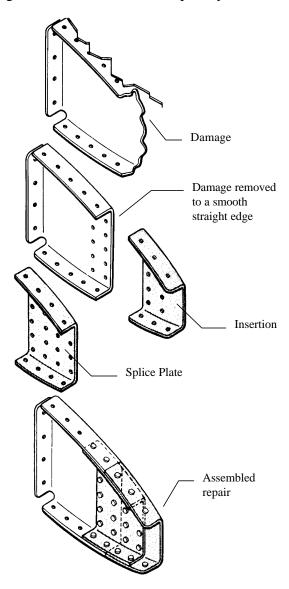
Rib Patching Illustration

The following illustration shows a web and flange rib repair by patching:



Rib Insertion Illustration

The following illustration shows a rib repair by insertion:



Definition

Any major vertical structural member of a semi-monocoque construction may be considered a bulkhead.

Characteristics

Bulkheads have the following characteristics:

- Maintain the required external contour at the station where they are located
- Give rigidity and strength to the structure
- Are constructed similar to that of wing ribs

Guidelines for Bulkhead Repair

Bulkhead repairs usually follow the same general guidelines as a web and flange repair for a rib. Follow the guidelines in the aircraft SRM.

Definition

A longeron is a fore-and-aft member of the fuselage or nacelle.

Characteristics

Longerons have the following characteristics:

- Usually run continuous across a number of points of support, such as frames or bulkheads
- Along with stringers, are the major load-carrying members and stiffeners

Guidelines for Longeron Repair

Longeron repairs follow the same general guidelines as a stringer repair. Follow the guidelines in the aircraft SRM.

Introduction

There are various types of sheet metal bending equipment used to bend sheet metal.

Types of Bending Brakes

The two most common types used at aviation field units are the:

- Box and pan brake
- Cornice brake

For More Information

For information on other types of bending equipment refer to the references listed at the beginning of this assignment.

Guidelines for Care and Use of Brakes

To keep brakes in good condition, you should:

- Keep the working parts well oiled and be sure the jaws are free of rust and dirt.
- When operating a brake, be careful to avoid doing anything that would spring the parts, force them out of alignment, or otherwise damage them.
- Never bend metal that is beyond the machine's capacity with respect to thickness, shape, or type.

Springback

Most metals have a tendency to return to their normal shape, a characteristic know as *springback*. Bend the metal 2 - 3 degrees more than desired to allow for springback.

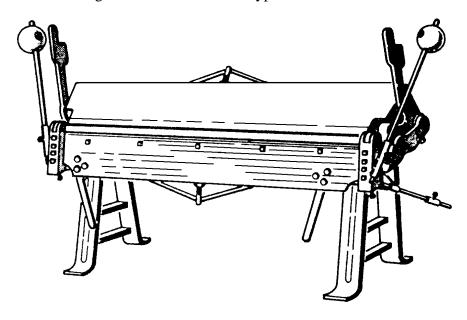
Cornice Brake 5.B.29

Description

The cornice brake is designed to bend large sheets of metal. It can be adjusted to handle a variety of metal thickness' and to bend metal to a variety of radii.

Cornice Brake Illustration

The following illustration shows one type of cornice brake.



Brake Use

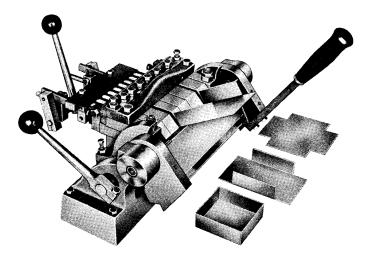
The cornice brake must be setup for each particular job. Always follow the manufacturer's instructions for the setup, adjustment, and operation.

Description

The box and pan brake is designed for making boxes of various sizes and shapes and it permits the forming of all sides without distorting any of the finished bends. The clamping leaf is divided into sections called fingers or shoes. These fingers vary in width, are interchangeable, and correspond in size to the radius used when bending metal (e.g., ¼").

Box and Pan Brake Illustration

The following illustration shows one type of box and pan brake.



Brake Use

The box and pan brake must be setup for each particular job. Always follow the manufacturer's instructions for the setup, adjustment, and operation.

Introduction

Bending sheet metal involves many important steps. Some steps may be applicable to a specific repair as outlined in an aircraft's SRM, but there are some general working practices that always apply when performing bend layout and bending operations.

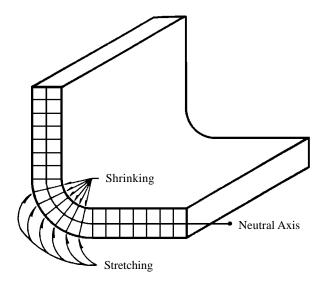
Guidelines for Bending Sheet Metal

The following are general working guidelines for bending sheet metal:

- Every effort is made to duplicate the strength of the original structural components that have incurred damage.
- All sharp corners are to be avoided by allowing generous corner radii.
- Be meticulous with edge preparation (filing, deburring) to relieve stresses and avoid subsequent cracks.
- Be careful to keep materials clean and free of scratches during preparation.
- Draw all lines with a soft-lead pencil (hard lead will scratch the surface); use isopropyl alcohol or acetone to remove all traces of lead following the bending operations.
- Make all bends *across* the grain of the metal (cracks may form if bent with the grain).
- Drill relief holes anytime two bends intersect to prevent strains from being set up at the intersection of the bends.

Bending Illustration

The following illustration demonstrates the effects that bending has on sheet metal.



Effects and Descriptions Table

These are the effects and descriptions of bending sheet metal.

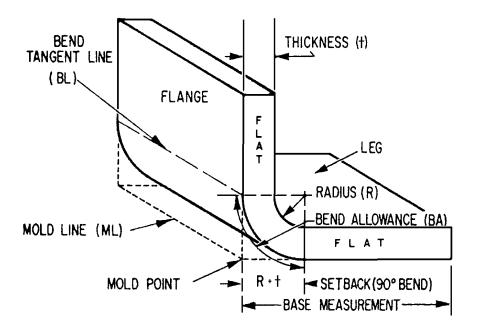
Effects	Description
Shrinking	The metal is compressed on the inside of the bend.
Stretching	The metal is stretched on the outside of the bend.
Neutral line or axis	Point at which the metal neither shrinks nor stretches and the forces of compression and stretching are "neutral".

Introduction

When bending metal to exact dimensions, the amount of material needed to form the bend must be known. You must be familiar with the terms used in bending sheet metal so that you can correctly layout measurements.

Bending Terms Illustration

The following illustration shows bending terms in relation to a piece of sheet metal with a 90 degree bend.



Bend Allowance Terminology Table

The following table lists sheet metal bending terms and their description. Refer to the illustrations on the previous and following pages.

Term	Description						
Bend allowance	The amount of material consumed in making a bend. There are two methods used to determine bend allowance. Use the following formula:						
(BA)	FORMULA: $(0.01743 \text{ x R} + 0.0078 \text{ x T}) \text{ x N} = \text{BA}$						
	R = the desired bend radius.						
	T = the thickness of the material						
	N = the number of degrees of bend						
	BA = bend allowance						
	Or, refer to a Bend Allowance chart which has pre-calculated bend allowances. Refer to the General Structural Repair manual, AFTO 1-1A-1 (NAVAIR 01-1A-1) for bend allowance tables.						
	BEND ALLOWANCE (BA)						
Closed angle	An angle that is less than 90 degrees when measured between legs.						
	CLOSED ANGLE						

The following is a continuation of the bend allowance terminology table.

inued)	
Term	Description
Open angle	An angle that is more than 90 degrees when measured between legs or less than 90 degrees when the amount of bend is measured.
	OPEN ANGLE
	450
Flange	The shorter part of a formed angle – the opposite of leg. If each side of the angle is the same length, then each is known as a leg.
	FLANGE
Flat	The flat portion of a part is that portion not included in the bend. It is equal to the base measurement minus the setback(s).
	F L A T

The following is a continuation of the bend allowance terminology table.

Term	Description
Leg	The longer part of a formed angle.
K number	A "K" number is one of 179 numbers on the K-chart that corresponds to one of the angles between 0 and 180 degrees to which metal can be bent. When metal is to be bent to any angle other than 90 degrees (K number of 1.0), the corresponding K number is selected from the chart and multiplied by the sum of the radius and the thickness of the metal. The product is the amount of setback for the bend. Refer to the General Structural Repair manual, AFTO 1-1A-1 (NAVAIR 01-1A-1), for detailed information about the K-chart.

The following is a continuation of the bend allowance terminology table.

i <u>nued)</u>	
Term	Description
Bend line	The bend line (also called the brake or sight line) is the layout line on the metal being formed that is set even with the nose of the brake jaw, and it serves as a guide in bending the work.
	Before forming a bend, it must be decided which end of the material can be most conveniently inserted in the bending brake. The bend line is then measured and marked from the bend tangent line closest to the end that is to be placed under the brake. This measurement should be equal to the radius of the bend. The metal is then inserted in the brake so that the nose of the brake jaw will fall directly over the bend line.
	Sight Line Brake Jaw: adjust back one material thickness from bending leaf Bend Tangent Lines Bend Tangent Lines
Bend tangent line (BL)	The line at which the metal starts to bend, and the line at which the metal stops curving. BEND TANGENT LINE (BL)

The following is a continuation of the bend allowance terminology table.

nuea) _	
Term	Description
Mold line (ML)	The line formed by extending the outside surfaces of the leg and the flange. (An imaginary point from which real base measurements are provided on drawings.)
	MOLD LINE (ML)
Mold point	An imaginary point at the outside intersection of the flange and leg
	MOLD POINT
Base measurement	The base measurement is the outside dimension of a formed part. A combination square can be used to measure the outside surfaces of a formed part.
	BASE MEASUREMENT——

The following is a continuation of the bend allowance terminology table.

Term	Description
Radius (R)	The radius of the bend is always to the inside of the metal being formed unless otherwise stated. It will be stated in the aircraft SRM. The bending brake jaw (or finger) size used to bend the metal must also correspond to the bend radius given in the aircraft SRM.
Setback	The setback (SB) is the distance from the bend tangent line to the mold point.
	In a 90 degree bend, $SB = R + T$ (radius of bend plus thickness of the metal). The setback dimension must be determined prior to making the bend because setback is used in determining the location of the beginning bend tangent line.
	Setback for bends other than 90 degrees is determined by using a K-chart.
	R++ SETBACK (90° BEND)

Purpose

The purpose of a bend allowance chart is to provide a quick reference for determining the bend allowance for a bend. The chart can be used instead of calculating bend allowance by using the bend allowance formula.

Bend Allowance Chart Illustration

The following is a bend allowance chart. It is only a partial listing for illustrative purposes.

THICKNESS	1/32	1/16	3/32 .094	1/8	5/32 .156	3/16	7/32 .219	1/4	9/32 .281	5/16 .313	11/32 .344	3/8 .375	7/16 .438	1/2
.020	.062	.113	.161	.210	.259	.309	.358	.406	.455	.505	.554	.603	.702	.799
	.000693	.001251	.001792	.002333	.002874	.003433	.003974	.004515	.005056	.005614	.006155	.006695	.007795	.008877
.025	.066	.116	.165	.214	.263	.313	.362	.410	.459	.509	.558	.607	.705	.803
	.000736	.001294	.001835	.002376	.002917	.003476	.004017	.004558	.005098	.005657	.006198	.006739	.007838	.008920
.028	.068	.119	.167	.216	.265	.315	.364	.412	.461	.511	.560	.609	.708	.804
	.000759	.001318	.001859	.002400	.002941	.003499	.004040	.004581	.005122	. 005680	.006221	.006762	.007853	.007862
.032	.071	.121	.170	.218	.267	.317	.366	.415	.463	.514	.562	.611	.710	.807
	.000787	.001345	.001886	.002427	.002968	.003526	.004067	.004608	.005149	.005708	.006249	.006789	.007889	.008971
.038	.075	.126	.174	.223	.272	.322	.371	.419	.468	.518	.567	.616	.715	.812
	.000837	.001396	.001937	.002478	.003019	.003577	.004118	.004659	.005200	.005758	.006299	.006840	.007940	.009021
.040	.077	.127	.176	.224	.273	.323	.372	.421	.469	.520	.568	.617	.716	.813
	.00853	.001411	.001952	.002493	.003034	.003593	.004134	.004675	.005215	.005774	.006315	.006856	.007955	.009037
.051		.134 .001413	.183 .002034	.232 .002575	.280 .003116	.331 .003675	.379 .004215	.428 .004756	.477 .005297	.527 .005855	.576 .006397	.624 .006934	.723 .008037	.821 .009119

Chart Particulars

To determine bend allowance for any degree of bend by use of the bend allowance chart, find the allowance per degree for the thickness of the material and the radius of bend in question, and then multiply by the number of degrees in the bend.

Radius of bend is given as a decimal fraction on the top line of the chart. Bend allowance is given directly below the radius figures. The top number in each case is the bend allowance for a 90 degree angle, while the lower placed number is for a one degree angle. Material thickness is given in the left column of the chart.

Determining
Bend Allowance
for 90 Degree
Bends

To determine the bend allowance for a 90 degree bend, use the step action table below. The following scenario criteria applies:

- Metal sheet thickness is .040
- Bend radius is \(\frac{1}{4}\) (.250)

Step	Action
1	Read across the top of the chart and find the column for a radius of bend of 1/4".
2	Find the block in the column that is opposite the metal thickness of .040.
3	Use the top number (.421) in the block for bend allowance421 is the bend allowance for this scenario.

Determining Bend Allowance for "Other Than" 90 Degree Bends To determine the bend allowance for other than 90 degree bends, use the step action table below. The following scenario criteria applies:

- Metal sheet thickness is .040
- Bend radius is \(\frac{1}{4}\) (.250)
- Degree of bend desired is 60 degrees

Step	Action
1	Read across the top of the chart and find the column for a radius of bend of 1/4".
2	Find the block in the column that is opposite the metal thickness of .040.
3	Multiply the bottom number in the block by 60 (.281)281 is the bend allowance for this scenario.

Purpose

The purpose of a setback K-chart is to calculate setback for angles larger or smaller than 90 degrees.

Setback K-chart Illustration

The following is a K-chart.

				other than 90 ° = K [R + T]			
Ang [deg]	K-value	Ang (deg)	K-value	Ang [deg]	K-value	Ang [deg]	K-value
1	0.00873	46	0.42447	91	1.0176	136	2.4751
2	0.01745	47	0.43481	92	1.0355	137	2.5386
3	0.02618	48	0.44523	93	1.0538	138	2.6051
4	0.03492	49	0.45573	94	1.0724	139	2.6746
5	0.04366	50	0.46631	95	1.0913	140	2.7475
6	0.05241	51	0.47697	96	1.1106	141	2.8239
7	0.06116	52	0.48773	97	1.1303	142	2.9042
8	0.06993	53	0.49858	98	1.1504	143	2.9887
9	0.07870	54	0.50952	99	1.1708	144	3.0777
10	0.08749	55	0.52057	100	1.1917	145	3.1716
11	0.09629	56	0.53171	101	1.2131	146	3.2708
12	0.10510	57	0.54295	102	1.2349	147	3.3759
13	0.11393	58	0.55431	103	1.2572	148	3.4874
14	0.12278	59	0.56577	104	1.2799	149	3.6059
15	0.13165	60	0.57735	105	1.3032	150	3.7320
16	0.14054	61	0.58904	106	1.3270	151	3.8667
17	0.14945	62	0.60086	107	1.3514	152	4.0108
18	0.15838	63	0.61280	108	1.3764	153	4.1653
19	0.16734	64	0.62487	109	1.4019	154	4.3315
20	0.17633	65	0.63707	110	1.4281	155	4,5107
21	0.18534	66	0.64941	111	1.4550	156	4.7046
22	0.19438	67	0.66188	112	1.4826	157	4.9151
23	0.20345	68	0.67451	113	1.5198	158	5.1455
24	0.21256	69	0.68728	114	1.5399	159	5.3995
25	0.22169	70	0.70021	115	1.5697	160	5.6713
26	0.23087	71	0.71329	116	1.6003	161	5.9758
27	0.24008	72	0.72654	117	1.6318	162	6.3737
28	0.24933	73	0.73996	118	1.6643	163	6.6911
29	0.25862	74	0.75355	119	1.6977	164	7.1154
30	0.26795	75	0.76733	120	1.7320	165	7.5957
31	0.27732	76	0.78128	121	1.7675	166	8.1443
32	0.27/32	77	0.79543	121	1.8040	167	8,7769
32	0.296/4 0.29621	78	0.80978	122	1.8418	168	9.5144
33	0.30573	79	0.80978	123	1.8807	169	10.385
35	0.305/3	80	0.82434 0.83910	124 125	1.8807	170	10.385
35 36	0.31530	81	0.83910	125	1.9210	170	12.706
36 37	0.32492	82	0.85408	126	2.0057	171	14.301
37 38	0.33459	82	0.86929	12/ 128	2.0503	172	14.301
38 39		84			2.0503	173	19.081
	0.35412	84 85	0.90040	129			
40	0.36397		0.91633	130	2.1445	175	22.904
41	0.37388	86	0.93251	131	2.1943	176	26.636
42	0.38386	87	0.94890	132	2.2460	177	38.138
43	0.39391	88	0.96569	133	2.2998	178	57.290
44	0.40403	89	0.98270	134	2.3558	179	114.590
45	0.41421	90	1.0000	135	2.4142	180	Infinite

Determining Setback with a K-Chart

To determine the setback for angles larger or smaller than 90 degrees, use the step action table below. The following scenario criteria applies:

- Setback formula (is always): Setback = K(R+T)
- Bend radius is \(^1\square\) (.250)
- Metal thickness is .040
- Angle of bend is 45 degrees

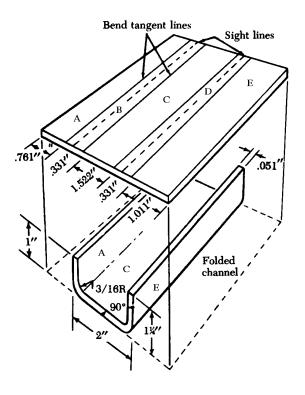
Step	Action
1	Determine the angle of bend desired (45 degrees).
2	Add the bend radius and the metal thickness $(.250 + .040 = .290)$.
3	Find the K value for a 45-degree angle (0.41421).
4	Multiply the K value by the results in Step 2 $(0.41421 \text{ x } .290 = .120)$ 120 is the setback for this scenario.

Introduction

The following pages will outline bend layout steps for the below illustration and scenario information.

Bend Layout Illustration

Refer to the following bend layout illustration while reading the subsequent bend layout procedures.



Scenario Information

The following criteria is given for this scenario:

- Fabricate a channel from a flat layout
- Flat A is 1"
- Flat C is 2"
- Flat E is 1 1/4"
- Material thickness is .051
- Radius of the bend is to be 3/16" (0.188)

Bend Layout Procedures

The following steps outline the procedures for bend layout to fabricate a channel *not* intended for patch or insertion material. An example of what it could be used for is a reinforcement riveted to a flat piece of metal to add strength and prevent buckling.

Step	Action
1	 Square a corner of the metal. Now there are two straight sides.
	 Lay out lines from the side that allows all lines to be drawn <i>across</i> the metal grain direction. DO NOT lay out lines <i>with</i> the metal grain direction because cracks will form during the bending evolution. See the below illustration.
	Squared corner Straight side
	Straight side Grain Direction
	Notice that the lines can be drawn between 45 and 90 degrees from the metal's grain direction. If possible, always layout lines 90 degrees from the metal's grain direction, as is illustrated above. When this is not possible due to the required bend line position, draw bend lines within a 45 to 90 degree area. Anything less than 45 degrees increases the possibility of cracks developing when bending.

Bend Layout Procedures (Continued)

This is a continuation of the bend layout procedures step action table.

Step	Action
2	Determine the setback to establish the distance of the flats.
	- The setback for the first bend:
	Setback = R + T = 0.188 + 0.051 = 0.239
	- The first flat (A) is equal to the overall dimension less setback:
	Flat A = 1.000 - 0.239 = 0.761
	 Mark off this distance and draw the line for flat A (this is also the first bend tangent line).
3	Calculate the bend allowance (B) for the first bend. Consult a bend allowance chart or use the formula:
	-BA = 0.3307 or .331 (rounded to nearest thousandth).
	 Mark off this distance from the line drawn in Step 2 and draw a line (this is the next bend tangent line).
4	Lay off the second flat (C). This is equal to the overall dimension less the setback at each end, or flat (C) minus two setbacks:
	- Flat C = 2.00 - (0.239 + 0.239) = 2.000478 = 1.522
	 Mark off this distance and draw a line (this is the third bend tangent line).

Bend Layout Procedures (Continued)

This is a continuation of the bend layout procedures step action table.

Step	Action
5	The bend allowance for the second bend (D) is the same at that for the first bend (0.331). Mark off this distance and draw the fourth and last bend tangent line.
6	The third flat (E), is equal to the overall dimension less the setback: - Flat E = 1.250 - 0.239 = 1.011 - Mark off this distance and draw a line.
7	Cut off the excess material. Mark off the bend sight lines. This is done by measuring out one bend radius from the bend tangent line closest to the end which is to be inserted under the nose of the brake jaw.

Bend Layout Procedures (Continued)

This is a continuation of the bend layout procedures step action table.

Step	Action
8	Insert the metal in a brake facing in the proper direction as explained in step 6 (see the below illustration), and then bend flats A and E to 90 degrees
	Sight Line Brake Jaw: adjust back one material thickness from bending leaf Bend Tangent Lines Bend Fangent Lines
	Important: as noted in the above illustration, the brake jaw must be adjusted back one material thickness for bends 90 degrees and greater. This permits the metal to flow correctly. Otherwise the metal could be cut due to the compressing action of the bending leaf.

Summary

When adding the measurements of flats A, C, and E, and both bend allowances, you get 3.956, or approximately 4.00 inches. If you had simply added the three overall dimensions 1, 2, and 1 ¼ inches the total would have been 4.250 inches of material length.

You can see how setback and bend allowance affect material lengths in forming bends. In this case the reduction is approximately ¼ inch.

Introduction

The job aids shown on the following pages were created to help show the order of layout lines for a bend layout.

Two different job aids are shown and are used for different reasons. Sometimes they will both be needed to complete a bend layout. The job aids are called:

- base measurement
- doubler

Baseline Dimensioning

The calculations in the running totals column of the job aides use baseline dimensioning. Baseline dimensioning bases all measurements from the same referenced starting point i.e., the edge of the metal that all lines are drawn from. This method of measuring provides consistent, accurate layouts.

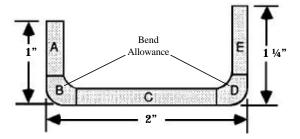
NOTE

In the procedure steps on the previous pages, all subsequent measurements were made from the previously drawn line or reference point. This is called "continuous dimensioning".

Job Aid Guidelines

Refer to these guidelines while working with the job aids.

- Bend layout and the use of these job aids requires practice to attain even a minimum amount of proficiency.
- These job aids can be manually drawn and used at the job site.
- Refer to a decimal chart when converting to fractions. Be careful
 that the correct fraction is determined; rarely will you exactly
 match the decimal number to a fraction. In these cases you must
 determine, and use, the fraction closest to the decimal number.
- The following illustration shows how the letters in the job aids relate to a formed bend layout.



Purpose for Base Measurement Job Aid

The base measurement job aid is used to:

- Calculate base measurements to form a piece of metal.
- Calculate base measurements of pre-formed components such as C-stringers, longerons, etc. (needed to prepare a doubler).

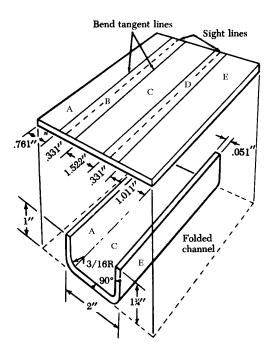
Scenario

The same criteria as the previous scenario is used here again.

- Fabricate a channel from a flat layout
- Flat A is 1"
- Flat C is 2"
- Flat E is 1 1/4"
- Material thickness is .051
- Radius of the bend is to be 3/16" (0.188)

Bend Layout Illustration

The following bend layout illustration corresponds to the below job aid.



Base Measurement Job Aid Example

The following is a base measurement job aid example for bend layout calculations. The calculations shown in this example correspond to the procedure steps on the previous pages.

BA = .331 Material Thickness = .051"		A	В	С	D	E	F	G
1	Base Measurement	1.000		2.000		1.250		
2	Setback or Double Setback	0.239		0.478		0.239		
3	Flats	0.761	0.331	1.522	0.331	1.011		
4	Convert to Fractions	49/64	21/64	1 33/64	21/64	1 1/64	4 L	√ ⊥
5	Running Totals	49/64	1 3/32	2 39/64	2 15/16	3 63/64	•	•

Job Aid Procedures Table

The following base measurement job aid procedures table corresponds to the steps listed in the base measurement job aid.

Step	Action
1	Determine the length of the flats and convert to decimals. Place the measurements in the applicable columns.
2	Determine the radius and thickness of the base material component, then compute setback $(R+T)$. Remember, if other than a 90-degree bend, use the setback K-chart.
	Determine double setback, 2(R+T). This number is placed in column C in this example. Double setback must be allowed for when a flat is between two bends.
3	Subtract row 2 in the columns from row 1. This is the new length of the flats.
	Between the flats you must allow for bend allowance. Determine bend allowance and place the decimal number in the applicable column, in this case B and D.
4	Covert all decimal numbers in row 3 to fractions.
5	Add the running totals.
	In the example, $49/64 + 21/64 = 13/32$. And then, $13/32 + 133/64 = 239/64$ and so on The arrows aid in following the correct order.
	The running totals row shows where to lay out each dimension line.

Doubler Job Aid 5.B.29

Introduction

The following doubler job aid example is built upon the base measurement job aid on the preceding pages. Refer back to the scenario and illustrations there.

Purpose for Doubler Job Aid

The doubler job aid is used to calculate the measurements for a doubler bend layout.

Procedures Prior to Using Doubler Job Aid

Before the doubler job aid can be used, the base measurement job aid must first be completed. Look at is this way – before you can fabricate a channel to insert in a stringer, you must first know the dimensions of the stringer. Otherwise, you could not accurately layout the bend lines for a proper fit after forming.

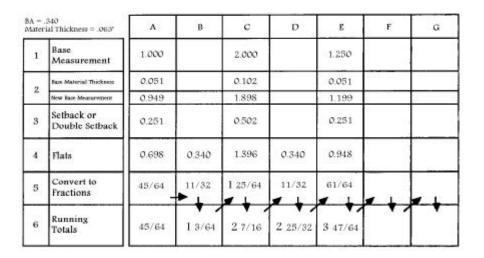
Base Measurement Job Aid Example

The following base measurement job aid example is shown here again to aid in referencing when reading the doubler job aid procedures.

BA = .331 Material Thickness = .051"		A	В	С	D	Е	F	G
1	Base Measurement	1.000		2.000		1.250		
2	Setback or Double Setback	0.239		0.478		0.239		
3	Flats	0.761	0.331	1.522	0.331	1.011		
4	Convert to Fractions	49/64	21/64	1 33/64	21/64 √ ⊥	1 1/64		# 1
5	Running Totals	49/64	1 3/32	2 39/64	2 15/16	3 63/64	V /	

Doubler Job Aid Example

The following is an example of a doubler job aid for bend layout calculations. As you read the procedures on the next page you will see how these calculations relate to the base measurement job aid above.



Job Aid Procedures Table

The following doubler job aid procedures table corresponds to the steps listed in the doubler job aid.

Step		Action							
1	Using a combination square, determine the outside dimensions of the base material component and convert to decimals. Place the measurements in the applicable columns.								
2	will fit on th	Base material thickness: this must be accounted for so that the formed metal will fit on the inside or outside of the base material component. Note that the measurement is doubled in column C between the two bends.							
	New Base M	<u>Measurement</u> : use the belo	ow decision table.						
		If	Then						
		the doubler is to be fastened to the <i>inside</i> of the base material	subtract from the base measurement.						
		the doubler is to be fastened to the <i>outside</i> of the base material	add to the base measurement.						
3	Determine the radius and thickness of the base material component, then compute setback $(R+T)$. Remember, if other than a 90-degree bend, use the setback K-chart.								
	Determine double setback, 2(R+T). This number is placed in column C in this example. Double setback must be allowed for when a flat is between two bends.								
4	Subtract row 3 in the columns from the new base measurement in row 2. This is the new length of the flats.								
	Between the flats you must allow for bend allowance. Determine bend allowance and place the decimal number in the applicable column, in this case B and D.								
5	Covert all de	ecimal numbers in row 4	to fractions.						
6	Add the rundimension li	_	totals row shows where t	to lay out each					

Questions

Answer the following questions on aircraft structural damage repair:

1. Match the aircraft structural damage inspection methods in column A to their descriptions in column B. Use each letter only once.

Column A		Column B
1. Visual	a.	Secondary damage may be found during this method.
2. Nondestructive test	b.	Determines if the metal has lost any strength.
3. Hardness test	c.	Dye-penetrant is a type of this method.
	d.	Is a pre-inspection procedure.

2. Match the classifications of aircraft structural damage in column A to their descriptions in column B. Use each letter only once.

Col	lumn A		Column B
	Jegligible amage	a.	Can be permitted to exist or can be corrected by a simple procedure.
re	Damage epairable by atching	b.	Gives original strength, by inserting a length of repair material of the same shape and characteristics.
re	Damage epairable by nsertion	c.	Reinforcement is used to bridge the damaged portion.
n	Damage ecessitating eplacement	d.	Cannot be repaired by any practical means.
		e.	Not a damage classification.

Questions (Continued)

3. Match the aircraft structural damage repair types in column A to their description in column B. Use each letter only once.

Column A		Column B
1. Permanent	a.	Restores the load carrying ability of the structure but is not aerodynamically smooth or able to satisfy interchangeability requirements.
2. Temporary	b.	Restores a limited load-carrying ability to the damaged structure in order to fly the aircraft to a facility that can perform the necessary repair.
3. One-time flight	c.	Restores the strength of the repaired structure equal to or greater than its original strength, and satisfies aerodynamic, thermal, and interchangeability requirements.
	d.	Not a type of damage repair.

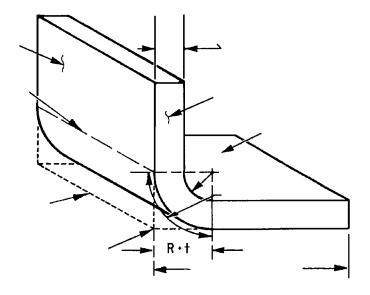
Questions (Continued)

4. Match the internal aircraft components in column A to their characteristics in column B. Each component has two answers.

Column A	Column B
,1. Stringer	a. Any major vertical structural member of a semi-monocoque construction.
,2. Spar	b. Helps absorb the bending loads imposed on wings or other airfoils.
,3. Rib	c. Designed to stiffen the skin.
,4. Bulkhead	d. Repair follows the same general guidelines as a stringer repair.
	e. Gives rigidity and strength to the structure.
	f. Principle chordwise member in airfoils.
	g. Transfers stresses from the skin to the bulkheads and ribs.
	h. Fore-and-aft member of the fuselage.
	i. Main spanwise member of a wing.
	j. Resists compression and shear loads.
• -	netal bending brake is designed to bend large can be adjusted to handle a variety of metal radii?

Questions (Continued)

- 6. What type of sheet metal bending brake is designed for making boxes of various sizes and shapes and permits the forming of all sides without distorting any of the finished bends?
- 7. In the below illustration, label the arrows with the correct bend layout terms.



5.B.29 Aircraft Structural Damage Repair Self-Quiz (Continued)

Questions	
(Continued)	

ons	8.	What are the two methods used to determine bend allowance?
nued)		1)
		2)

9. Match the bend allowance terms in column A with their definitions in column B. Use each letter only once.

Column A			Column B		
1.	Bend allowance	a.	The distance from the bend tangent line to the mold point.		
2.	Bend tangent line	b.	The outside dimension of a formed part.		
3.	Bend line	c.	The line at which the metal starts to bend, and the line at which the metal stops curving.		
4.	Base measurement	d.	The layout line that is set even with the nose of the brake jaw.		
5.	Setback	e.	The amount of material consumed in making a bend.		
		f.	The longer part of a formed angle.		

Questions
(Continued)

10.	When laying out lines during bend layout steps, you should draw lines the metal grain direction.
11.	DO NOT draw bend layout lines with the metal grain direction because
12.	Bend sight lines are marked off by measuring out from the bend tangent line closest to the end which is to be inserted under the nose of the brake jaw.
13.	When bending metal in a brake, the brake jaw must be adjusted back for bends 90 degrees and greater.

Feedback

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	1. a 2. c 3. b	4 5 5
2.	1. a 2. c 3. b 4. d	6 7 7 8
3.	1. c 2. a 3. b	9
4.	1. c, g 2. b, i 3. f, j 4. a, e 5. d, h	11 13 14 16 17
5.	Cornice Brake	19
6.	Box and Pan brake	20

Aircraft Structural Damage Repair Self-Quiz Feedback (Continued)

Feedback (Continued)

The following is a continuation of the self-quiz feedback:

Question	Answer	Reference
7.	FLANGE BEND TANGENT LINE (BL.) MOLD LINE (ML.) MOLD POINT R.+ SETBACK(90° BEND) BASE MEASUREMENT	23
8.	1) Bend allowance formula	24
	2) Bend allowance chart	
9.	1. e	24
	2. c	27
	3. d	27
	4. b	28
	5. a	29
10.	across	35
11.	cracks will form during the bending evolution.	35
12.	one bend radius	37
13.	one material thickness	38

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Performance 1

REPAIR a corrosion damaged aircraft structure.

Example: skin, rib, stringer, etc.

Given a corrosion damaged aircraft structure and the necessary equipment, determine the damage classification and REPORT the findings to your supervisor IAW the aircraft's Structural Repair Manual.

HH-65A

HH-60J

HC-130H

HU-25A

Continued next page

5.B.29

Syllabus

Performance 1, Objective 2

Given a corrosion damaged aircraft structure and the necessary equipment, **REMOVE** the corrosion as required using one or more of the following references.

HH-65A

- AR&SC Technical Services
- TCTO's
- MPC Index
- 1H-65A-3
- NAVAIR 01-1A-509

HH-60J

- AR&SC Technical Services
- TCTO's
- MPC Index
- A1-H60CA-SRM-300
- A1-H60HA-SRM-000
- NAVAIR 01-1A-509

HC-130H

- AR&SC Technical Services
- TCTO's
- MPC Index
- 1C-130A-3
- 1C-130A-23
- NAVAIR 01-1A-509

Performance 1, Objective 2 (Continued)

HU-25A

- AR&SC Technical Services
- TCTO's
- MPC Index
- 1U-25A-3
- 1U-25A-23
- NAVAIR 01-1A-509

Performance 1, Objective 3

Given a damaged aircraft structure and the necessary equipment, **FABRICATE** a repair for the given structure area using one or more of the following references.

HH-65A

- AR&SC Technical Services
- TCTO's
- 1H-65A-3
- AFTO 1-1A-1
- AFTO 1-1A-8

HH-60J

- AR&SC Technical Services
- TCTO's
- A1-H60HA-SRM-000
- AFTO 1-1A-1
- AFTO 1-1A-8

HC-130H

- AR&SC Technical Services
- TCTO's
- 1C-130A-3
- 1C-130A-23
- AFTO 1-1A-1
- AFTO 1-1A-8

Performance 1, Objective 3 (Continued)

HU-25A

- AR&SC Technical Services
- TCTO's
- 1U-25A-3
- AFTO 1-1A-1
- AFTO 1-1A-8

Performance 1, Objective 4

Given an aircraft structure area and the necessary equipment, **APPLY** the required protective coating(s) using one or more of the following references.

HH-65A

- TCTO's
- 1H-65A-3
- AFTO 1-1-8
- NAVAIR 01-1A-509

HH-60J

- TCTO's
- A1-H60CA-SRM-300
- A1-H60HA-SRM-000
- AFTO 1-1-8
- NAVAIR 01-1A-509

HC-130H

- TCTO's
- 1C-130H-2-00JG-00-1
- 1C-130A-3
- 1C-130A-23
- AFTO 1-1-8
- NAVAIR 01-1A-509

HU-25A

- TCTO's
- 1U-25A-3
- AFTO 1-1-8
- NAVAIR 01-1A-509

Performance 2	REPAIR a corrosion damaged aircraft electrical component.	
	Example: wiring, cables, connectors, etc.	
Performance 2, Objective 1	Given a corrosion damaged aircraft electrical component an necessary equipment, REMOVE the corrosion as required to or more of the following references.	
	HH-65A	
	• TCTO's	
	• MPC Index	
	• NAVAIR 16-1-540	
	НН-60Ј	
	• TCTO's	
	• MPC Index	
	• A1-H60CA-SRM-300	
	• NAVAIR 16-1-540	
	НС-130Н	A
	• TCTO's	
	• MPC Index	
	• 1C-130A-23	
	• NAVAIR 16-1-540	
	HU-25A	
	• TCTO's	
	• MPC Index	

Continued next page

• NAVAIR 16-1-540

Performance 2, Objective 2

Given a damaged aircraft electrical component and the necessary equipment, **PERFORM** the repair procedure applicable to the damage using one or more of the following references.

HH-65A

- AR&SC Technical Services
- TCTO's
- 1H-65A-2-2
- AFTO 1-1A-14
- NAVAIR 01-1A-505 (series)

HH-60J

- AR&SC Technical Services
- TCTO's
- A1-H60CA-WCR-000
- A1-H60JA-WDM-000
- AFTO 1-1A-14
- NAVAIR 01-1A-505 (series)

HC-130H

- AR&SC Technical Services
- TCTO's
- 1C-130H-2-13
- AFTO 1-1A-14
- NAVAIR 01-1A-505 (series)

Performance 2, Objective 2 (Continued)

HU-25A

- AR&SC Technical Services
- TCTO's
- 1U-25A-2
- 1U-25A-2-9
- AFTO 1-1A-14
- NAVAIR 01-1A-505 (series)

Performance 2, Objective 3

Given an electrical component and the necessary equipment, **APPLY** the required protective coating(s) using one or more of the following references.

HH-65A

- TCTO's
- MPC Index
- NAVAIR 01-1A-509
- NAVAIR 16-1-540

HH-60J

- TCTO's
- MPC Index
- A1-H60CA-SRM-000
- A1-H60CA-SRM-300
- NAVAIR 01-1A-509
- NAVAIR 16-1-540

HC-130H

- TCTO's
- MPC Index
- 1C-130H-2-00JG-00-1
- 1C-130A-23
- NAVAIR 01-1A-509
- NAVAIR 16-1-540

Performance 2, Objective 3 (Continued)

HU-25A

- TCTO's
- MPC Index
- 1U-25A-2
- NAVAIR 01-1A-509
- NAVAIR 16-1-540

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Objectives

To successfully complete this assignment, you must study the text and master the following objectives:

- STATE the effects of vibration on the human body and aircraft.
- **STATE** the goals of vibration analysis.
- **STATE** the unit of measurement the CG uses to measure vibration.
- **STATE** the functions of vibration measuring equipment.
- **STATE** the characteristics of an imbalanced condition.
- **STATE** the purpose of flexible couplings.
- **STATE** the probable causes of different types of vibrations.

References

The information contained in this assignment can be found in the US Navy Helicopter Vibration Analysis manual, NAVAIR 01-1A-24.

5.B.30 Overview

Introduction

The purpose of this assignment is to introduce you to the equipment and terminology used for vibration analysis. It also lists some of the more common symptoms of vibration and their probable causes.

In This Assignment

In this assignment we will discuss the following topics:

Subject	Page
Effects of Vibration	3
Goals of Vibration Analysis	4
Equipment Used to Measure Vibration	5
Causes of Vibrations	6
Vibration Analysis Self-Quiz	. 11
Vibration Analysis Self-Quiz Feedback	. 12
Syllabus	. 13

Aircraft vibrations, if not eliminated or reduced to acceptable levels, can have detrimental effects on equipment and aircrew members.

Effects on Aircrew

Effects of direct vibration on the human body can be serious. Depending on the level of severity, vibrations can have varying degrees of the following effects on aircraft crewmembers:

- Discomfort from unwanted noise
- Fatigue
- Blurred vision
- · Loss of balance
- Loss of concentration

Effects on Equipment

Vibrations cause stress and fatigue on aircraft and equipment which can lead to component failure.

Vibration Analysis Goals

The goals of vibration analysis are as follows:

- Increase aircraft availability
- Reduce aircraft repair costs
- Improve aviation safety

Accomplishing Goals

To accomplish these goals vibration analysis provides the following:

- Insight assistance in troubleshooting vibration discrepancies
- Reduce maintenance staff hours
- Reduce removal of serviceable components
- Help determine the cause of chronic failures
- Plan repairs/component replacement
- Prevent unnecessary disassembly for inspection

Special equipment is used to perform vibration analysis on aircraft. The equipment is different for fixed-wing and rotary-wing aircraft as indicated below.

Vibration Measuring Systems

The Coast Guard is currently using the following vibration measuring systems to perform vibration surveys on the following aircraft:

HH-60J and HH-65A Helicopters

• Helitune Rotortuner

HC-130H and HU-25A Aircraft

• Quantec 9500

NOTE

Specific operating procedures for these systems can be found in each aircraft's applicable maintenance manuals and MPC cards.

Accelerometer

The accelerometer is a component of each vibration measuring system. Most systems typically use multiple accelerometers mounted at various positions on the component being surveyed. An accelerometer functions as a pickup assembly that senses the movement of the component it is mounted to and produces a voltage proportional to acceleration. This electrical signal is sent to the measuring unit for recording and interpretation.

Measurement

The Coast Guard uses velocity, measured in inches per second (IPS) to measure vibration.

Definition of Velocity

Velocity is the time rate of change of displacement or how many inches the accelerometer will move in one second.

Vibration is usually caused by imbalance or misalignment. Both conditions have unique symptoms which can help troubleshoot the cause of vibrations.

Imbalance

Imbalance exists to some degree in all rotating parts and is characterized by a vibration at once per revolution. Imbalance occurs when the mass center of rotation is different from the center of rotation. Since the center of rotation can't be moved, to balance the mass, the mass center must be moved. This is accomplished by adding weight opposite the force produced by the imbalance. The larger the radius of the mass, the less mass is required to produce the same force. For example, adding 20 grams at 2 inches from the center is the same as adding 2 grams at 20 inches from the center.

Characteristics of Imbalance

The following are characteristics of imbalance:

- The vibration will occur at the rate of once per revolution
- The phase will be stable
- The amplitude of the imbalance force will increase with rotational speed

NOTE

A once-per-revolution vibration may not always be imbalance but could be a sign of another problem, such as mechanical looseness.

Characteristics of Misalignment

Vibration due to misalignment is usually characterized by:

• Vibration at twice the running speed

6

• High levels of vibration in the fore and aft direction

Types of Misalignment

Misalignment takes the following forms:

- Pre-load from a bent shaft or improperly seated bearing
- Offset of the shaft's centerlines

NOTE

Flexible couplings increase the capability to tolerate misalignment, however, they are not a cure for serious alignment problems.

Types of Main Rotor Blade Vibrations

Main rotor blade vibrations are usually characterized by high levels of once-per-revolution vibrations or at the blade passing frequency (number of blades times rpm).

Types of Blade Problems

The following table lists several types of blade problems and the probable causes:

Problem	Probable Cause
Once-per-revolution vibrations in the plane of the rotor	Imbalance condition
Once-per-revolution vibrations out of the plane of the rotor	Out of track condition
Blade flies out of track from a hover to forward airspeed	Tabbing problems with the blade
Blade flies out of track from the ground to a hover	Blade chordwise weight problem

Types of Hardware/ Component Problems

The problems listed in the table below all indicate possible faulty hardware/components or incorrect installation.

Problem	Troubleshooting Tip
Once-per-revolution problems that are NOT caused by imbalance or track	Troubleshoot only that hardware/component that will affect one blade
When attempting to balance/track, the phase becomes unstable before the specified limit is reached	Troubleshoot only that hardware/component that will affect one blade
High vibration levels at blade pass frequencies (2/rev, 3/rev, 4/rev, etc.)	Troubleshoot only that hardware/component that will affect all of the blades

8

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Questions

Answer the following questions on Aircraft Vibration.

1.	List three of the effects that vibrations can have on the human body. 1)
2.	
3.	List at least two of the goals of vibration analysis. 1) 2)
1.	In aviation, what unit of measurement does the Coast Guard use to measure vibration?
5.	What component of vibration measuring equipment functions as a pickup assembly that senses the movement of the component it is mounted to and produces a voltage proportional to acceleration?
5.	An imbalanced condition is characterized by a vibration at
7.	What is used to increase the capability of components to tolerate misalignment?
3.	High vibration levels at blade-pass frequencies (2/rev, 3/rev, etc) generally indicate what type of problems?

Feedback

Compare your self-quiz answers with the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	List any three of the following:	3
	 Discomfort Fatigue Blurred vision Loss of balance Loss of concentration 	
2.	component failure	3
3.	List any two of the following:	4
	 Increase aircraft availability Reduce aircraft repair costs Improve aviation safety 	
4.	Inches per second (IPS)	5
5.	Accelerometer	5
6.	Once per revolution	6
7.	Flexible couplings	7
8.	Hardware or installation problems	8

Performance TROUBLESHOOT aircraft components for excessive vibration. **Performance** Given an aircraft component vibration discrepancy and General **Objective 1** Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG). **Performance** Given an aircraft component vibration discrepancy and necessary **Objective 2** equipment, **PERFORM** an operational check of the applicable system or component IAW one or more of the following references: **HH-65A** • MPC Index, Chapters 62, 64, and 71 **HH-60J** • MPC Index, Chapters 53, 62, 64, and 72 HC-130H 1C-130H-2-61JG-10-1 • 2J-T56-56 **HU-25A** • 2J-ATF3-2-1, Chapter 72 (Testing) • 2J-ATF3-2-2, Chapter 72 (Testing) • MPC Index, Chapter 71

Continued next page

5.B.30

Syllabus

Enabling Objective 3

Given an aircraft component vibration discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the vibration to the most probable component IAW one or more of the following references:

HH-65A

- 1H-65A-4
- 1H-65A-11-72-2B2
- 1H-65A-11-72-4B2
- MPC Index, Chapters 62, 64, and 71

HH-60J

- A1-H65CA-150-100 and -400
- A1-H65CA-220-100 and -400
- A1-H65CA-260-100 and -400
- MPC Index, Chapters 53, 62, 64, and 72

HC-130H

- 1C-130H-2-61FI-00-1
- 1C-130H-2-61JG-10-1
- 1C-130H-2-70FI-00-1-2

HU-25A

- 2J-ATF3-2-1, Chapter 72 (Testing)
- 2J-ATF3-2-2, Chapter 72 (Testing)
- MPC Index, Chapter 71

Enabling Objective 4

Given an aircraft component vibration discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A _______

• MPC Index, Chapters 62, 64, and 71

HH-60J

• MPC Index, Chapters 53, 62, 64, and 72

HC-130H

• 1C-130H-2-61JG-10-1

HU-25A

• 2J-ATF3-2-1, Chapter 72 (Testing)

• 2J-ATF3-2-2, Chapter 72 (Testing)

• MPC Index, Chapter 71

Enabling Objective 5

Given an aircraft system/component and necessary equipment, **PERFORM** a final operational check of the system/component to verify the vibration discrepancy has been corrected IAW one or more of the following references:

H	H-65A	
•	MPC Index, Chapters 62, 64, and 71	
H	H-60J	
•	MPC Index, Chapters 53, 62, 64, and 72	
H	С-130Н	
•	1C-130H-2-61JG-10-1	
•	2J-T56-56	
H	U-25A	
•	2J-ATF3-2-1, Chapter 72 (Testing)	
•	2J-ATF3-2-2, Chapter 72 (Testing)	
•	MPC Index, Chapter 71	

Objectives

To successfully complete this assignment, you must study the text and master the following objectives:

- **STATE** the correct manuals used by the Coast Guard for air station shop safety programs.
- **STATE** the standard on instructing safety in the Coast Guard.
- **SELECT** the definition of acute exposure.
- **SELECT** the definition of chronic exposure.
- **DESCRIBE** the effects of dermatitis.
- **STATE** the responsibility of the technician in the Coast Guard respiratory protection program.
- **SELECT** the proper oxygen concentration required for the use of air-purifying respirators.
- **STATE** the approval ratings required for the respirators used in the Coast Guard.
- **STATE** the warning associated with the maintenance and repair of respirators.
- **STATE** who is responsible for the ultimate success of the hearing conservation program.
- **LIST** the symptoms of a person showing signs of over exposure to excessive noise.
- **STATE** the first aid response for someone who is showing signs of over-exposure to excessive noise.
- **STATE** the decibel level at which hearing protection is required.
- **DEFINE** Noise Reduction Rating (NRR).
- **STATE** the two conditions that must be present to result in an electrical shock.
- **STATE** the amount of current flow that is usually considered fatal.
- **STATE** the meaning of secondary electrical injury.

References

The information in this assignment can be found in the following references:

- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)
- Safety and Environmental Health Manual, COMDTINST M5100.47 (series)
- Technical Guide: Practices For Respiratory Protection, COMDTINST M6260.2 (series)
- Hazardous Waste Management Manual, COMDTINST M16478.1 (series)
- First Aid and Health Lesson Plans, COMDTINST M6000.3 (series)
- Electronics Manual, COMDTINST M10550.25
- The Coast Guardsman's Manual (Blue Jacket's Manual), current edition

Overview 5.D.01c

Introduction

The purpose of this assignment is to introduce you to general safety and your responsibilities as a Aviation Maintenance Technician. This assignment will also give you a basic understanding of general safety guidelines, available sources of information, individual, supervisor, and command responsibilities.

Your Responsibility

As a Second Class Petty Officer you will have a hand in the training of both the Airman and AMT3's, therefore it is your responsibility to familiarize yourself with the publications listed and learn from the information in this course to safely train your subordinates.

In This Assignment

This assignment contains the following:

Subject Page
Types of Aviation Maintenance Publications5
Policy for Instructing Safety Lessons
Types of Eye Protection
Guidelines For Choosing Eye Protection
Cleaning Eye Protection
Personal Protection
Shop Safety Practices
Chemical Exposure
Types of Poisoning
Coast Guard Policy On Respiratory Protection
Atmospheric Supply Respirator
Air-Purifying Respirators
Types of Test Ratings for Respirators
How to Conduct a Respirator Negative Pressure Fit Check 25
How to Conduct a Respirator Positive Pressure Fit Check 26
How to Conduct a Pre-Use Fit Check for Respirators

In This Assignment (Continued)

Subject	Page
Respirator Care	28
Hearing Conservation	29
The Effects of Noise	30
Hearing Protection Devices	32
Noise Reduction Rating	34
Administering First Aid in a Shop	35
Eye Injuries and First Aid	36
Electrical Safety	37
Facts About the Effects of Electrical Shock	38
Types of Electrical Shock Injuries and Symptoms	39
Rescuing Electrical Shock Victims	40
Electromagnetic Radiation (RF) Hazards	41
General Shop Safety Self-Quiz	43
Self-Quiz Feedback	49
Syllabus	53

The following publications are used in the aviation maintenance safety programs and throughout the Coast Guard. Your ability to properly use and reference information within these manuals is integral to your job as an Aviation Maintenance Technician and will help as a guide for preparing your training lecture.

COMDTINST M13020.1 (series)

The Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) establishes shop safety standards and procedures for all Coast Guard aviation maintenance facilities. It contains information on basic shop safety practices and hand tool safety.

COMDTINST M5100.47 (series)

The Safety and Environmental Health Manual, COMDTINST M5100.47 (series) is used throughout the Coast Guard and sets forth the policy and the elements of the Coast Guard safety program.

COMDTINST M16478.1 (series)

The Hazardous Waste Management Manual, COMDTINST M16478.1 (series) prescribes policies and procedures for compliance with federal hazardous waste regulations for all Coast Guard ships and shore activities.

COMDTINST M6260.2 (series)

The Technical Guide: Practices for Respiratory Protection, COMDTINST M6260.2 (series) provides the technical information necessary for the safe use of respiratory protection devices and requirements for administering the respiratory protection program.

Coast Guardsman's Manual (current edition)

Otherwise known as the Blue Jacket's manual, this publication gives you an excellent overview of basic safety and first aid used in the Coast Guard.

Definition of Safety

Safety is the science and art devoted to the recognition, evaluation, and control of risk factors arising from man's environment which may cause injury, significant discomfort and inefficiency, property damage, or which could adversely affect the Coast Guard's mission capability.

Responsibility

You, as a member of the Coast Guard, have a personal responsibility to safeguard yourself and your fellow members as well as the government property entrusted to your care.

Instructing Standard

When instructing, only teach safety procedures and techniques that are 100% safe and IAW Coast Guard regulations.

Common-Sense Questions

Common-sense is your best protection and safety device. Only you know your physical limits and demands of your body. Below is a list of questions you should ask yourself and teach others to ask prior to doing any job.

- Are there published guidelines for this task?
- Do I have the required safety equipment?
- Do I know what is expected from me?
- Can I accomplish this task without hurting myself?
- Can I accomplish this task without hurting others?
- Do I have the required skills needed to do the task?
- Do I have the required tools/materials to do the task?
- Do I have any unanswered questions?

NOTE

When in doubt, ask your supervisor.

Various types of eye protection, like tools, have a specific use for the job at hand. There is no one type of eye protection that can be used for all applications. Some applications might require you to use two types of eye protection at one time.

Eye Protection and Their Descriptions

Listed below are some types of eye protection that protect your eyes, but in different ways.

Name of Protection	Descriptions
Safety Glasses	Similar in appearance to eye glasses, they have a mesh screen around the lenses to protect from large chips.
Safety Goggles	Protect by wrapping around your eyes much like a mask.
Safety Goggles (Liquid Use)	Protect by wrapping around your eyes much like a mask, but have small vents facing towards the back to prevent liquid from entering your goggles. This type is not to be used for grinding operations.
Face Shields	Used for covering your whole face, normally used for grinding operations and in conjunction with safety goggles.

Prescription Eye Glasses Warning

Though most prescription glasses are impact resistant they are not of the same standard as safety glasses and will not offer the required protection.

WARNING

Prescription eye glasses shall not be used as safety glasses. If you wear prescription eye wear, always put safety goggles or a face shield over your glasses.

Methods For Choosing Eye Protection

Eye protection has only one function. That is to protect your eyes. When selecting eye protection ensure that the proper type of eye protection is selected for the task at hand. There are several factors involved in determining what type of eye protection devices should be used. They are as follows:

- Read the:
 - label of the product that you are using
 - Material Data Safety Sheet (MSDS)
 - maintenance manual or ACMS/MSR MPC
- If your work includes:
 - looking upwards at work surface
 - mixing, pouring, or moving liquids
 - grinding operations
 - compressed gas use

Guidelines For Pre-Use Checks

Eye protection should be inspected prior to use. The following checks will be done prior to donning the eye wear. Check for the following characteristics:

- Proper protection for the job at hand (grinding, liquids etc.)
- Lens cleanliness
- · Lenses not scratched
- Strap or ear pieces intact
- Overall condition of the gear is in good repair (no loose hardware)

Eye protection, to be effective, must be usable. If eye protection is not clean and in usable condition no one will want to use it and this can cause accidents or injuries.

Cleaning Policy

Eye protection shall be stored and cleaned IAW the manufacturer's instructions and OSHA regulations.

Cleaning Eye Protection

Eye wear should be clean before you put it on and cleaned after you are done using it. There are various types of cleaning solutions but use only the types that:

- Are compatible with the lens (no harsh solvents)
- Have an anti-bacterial agent
- Have degreasing characteristics

Stowage of Eye Protection

Properly stowing eye protection is every bit as important as cleaning. Eye protection is not cheap and if not properly stowed will render the eye protection useless. After properly cleaning the eye protection, stow it by:

- Hanging it on hooks
- Placing in a well ventilated cabinet/rack
- Placing the eye protection in the case provided by the manufacture

NOTE

Never place the eye protection so that it is resting on the lenses. This will cause undesired scratching and impair the optical quality of the eye protection.

Your attitude towards safety is important. A good positive attitude and outlook will allow you to do the following:

- Achieve a maintenance goal safely
- Accomplish your job without injury
- Also by you using the proper safety equipment and projecting a good attitude, you enforce the safety standards to your subordinates.

Policy on Jewelry

The wearing of any type of jewelry, metal or non-metallic, shall not be worn while working in the shop or on aircraft.

NOTE

Medical Alert identification bracelets/necklaces are exempt from this rule.

Hazards of Jewelry

Jewelry can become caught on the side of the aircraft, snagged on machinery, or come in contact with live electrical circuits causing you to lose a finger, hand or become electrocuted.

Examples of Jewelry

Listed below are some examples of jewelry:

- Bracelets
- Earrings
- Necklaces/dog tags
- Rings
- Watches

Policy For Wearing Head Protection

Hard hats or head protection should be worn during any overhead work (any work over eye level) while on the hanger decks, shops, flight line, during crane and forklift operations or any work under an aircraft where there is a chance of hitting your head.

Protective Clothing

Clothing is issued as protective gear for a variety of reasons. It can be issued for to:

- Extreme temperatures (either cold or hot)
- Welding
- Grinding
- Painting
- Fire fighting operations

Care of Protective Clothing

Protective clothing is only as good as the condition it is in. Always clean and store the gear IAW the applicable publications.

Housekeeping is essential to shop safety. By keeping your shop and work area clean and clear of debris, you can dramatically cut down on the chance of injury.

Housekeeping Guidelines

Good housekeeping starts with a plan. Below is a list of general housekeeping guidelines that you should follow prior to starting a task. Always ensure that the:

- Work area is clean
- Work area is sufficient to accomplish the task
- Proper fire safety equipment is available
- Proper waste/spill containment is available
- Work area ha sufficient lighting

Machine Safety

In almost all maintenance shops within the Coast Guard there is some sort of machinery. Machine safety should be practiced by everyone who walks into a shop. Just because there is no loud noise associated with the machine, do not assume that it is off. There have been untold numbers of MISHAP reports from units stating that a person has been injured because of the "I thought it was secured" syndrome. Even though a machine has been secured, most machines require a long coast-down time to come to a complete stop.

Electrical Hand Tool Safety

Ensure that all power tools are properly grounded and check that none of the following exist:

- Frayed wire
- Bent prongs
- Split insulation
- Previous signs of arcing damage
- Flammable material or vapors are present

Continued Next Page

Hand Tool Safety

The use of hand tools causes more accidents annually than power driven tools. The main reason for this is the person using the tool. Often, the hand tool is being used for a purpose other than what it was designed for.

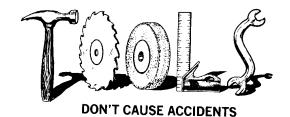
Non-Example of Hand Tool Safety

Some of the more obvious examples are the screwdriver being used as the pry bar. On top of the fact that most manufacturers print the caution on the handle informing the user not to do this, it still gets done. Result, a broken screwdriver and a technician with a hole in the hand or a chip of metal in the eye. Not to mention the paperwork the supervisor has to submit to the safety officer.

Don't Forget

Use the proper tool for the proper job and the proper tool, properly. Below is a list of some basic hand tool safety practices. For a full indepth discussion see the Aeronautical Engineering Maintenance Management Manual, M13020.1 (series).

- Do not throw tools from one person to the other
- Do not drop them down from one person to the other
- Do not carry them in your pockets
- Do not use defective tools





Due to the nature of the work of a maintenance technician, you are exposed to a bewildering array of chemicals. Chemicals are used every day for cleaning parts, aircraft, and floors. This section will introduce you to some of the more common problems associated with the effects of chemical exposure.

Definition of Acute Exposure

Acute exposure is the result of exposure to excessive concentrations of a chemical, fume, or mist within a short time period.

Example of an Acute Exposure

A technician was working in the fuel cell of a HC-130H when suddenly the technician started feeling dizzy, nauseous, and faint. This was presumably caused by the high concentrations of fuel vapors in the surrounding air and a possible leak in the technicians mask. Once removed from the area and breathing fresh air the technician was feeling fine.

Definition of Chronic Exposure

Chronic exposure is the result of being repeatedly exposed to a chemical, mist, or fume for prolonged periods of time.

Example of Chronic Exposure

A technician has worked the night shift for over eight months. With the fast-paced maintenance tempo, the technician decided putting on the proper hand protection seemed to be a waste of time while working with chemicals such as jet fuel and de-greasers, now the technician is constantly bothered with dried out itchy skin, the results of dermatitis.

Definition of Skin Absorption

Your body can absorb chemicals through the skin. Chemicals that are absorbed through the skin can damage or burn your skin, damage your liver, kidneys, blood cells or nervous system. Knowing the chemical you are using, its effects and how to protect yourself is important.

Example of Skin Absorption

An example of skin absorption is the medical skin patches that are used for cigarette smoking cessation programs. This patch has a medication which permeates the skin and is absorbed into the blood stream.

Definition of Dermatitis

Dermatitis is a condition in where the skin is red, swollen, and often cracked. This is caused by the skin being stripped from its natural body oils. Dermatitis can be an annoying and painful skin problem. Dermatitis is avoidable if you use the proper precautions.

Example of the Effects of Dermatitis

An example of dermatitis is the effect upon your hands after washing an aircraft. The cleaner that you use has chemicals that are designed to remove grease, be it grease from the aircraft or the natural oils of your hands, it makes no difference to the cleaner. Result: your hands feel dry and chapped due to the loss of natural oils in your hands.

Definition of Protective Gloves

Since the chances of you getting dermatitis is increased as an AMT, wear protective gloves whenever required. Putting on just any glove will not guarantee your safety. The proper glove for the type of exposure you will encounter must be used. Certain chemicals will deteriorate certain gloves. For the proper protection requirements read the MSDS.

Example of Correct Protective Gloves

You were assigned to do a composite repair on the airframe of a HH-65A. The maintenance manual tells you use hand protection when handling the resin and the catalyst. While reading the MSDS, latex surgical gloves are the type of hand protection recommended.

Non-Example of the Correct Protective Gloves

You are assigned to take fuel samples on an aircraft. You get a pair of surgical gloves from your shop instead of those heavy rubber fuel resistant gloves next to the fuel sampling gear. While you are taking the fuel samples, fuel drips on the latex gloves and they begin to swell then fall apart in a matter of minutes, leaving you with no protection.

Testing Rubber Gloves

Prior to putting on any rubber, latex, or plastic protective gloves, you should ensure that they are free from holes, tears, or cuts.

Rationale

The reasoning is simple, if there is a hole in the glove the liquid can enter, and the purpose of the glove has been defeated.

Procedure for Testing Rubber Gloves

To check your glove, follow the steps below.

Step	Action	
1.	Hold glove at each side of the edge of the gauntlet.	
	and the second second	
2.	Revolve it about the edge of the gauntlet, thus rolling it towards the palm and fingers.	
	Jun 16	
3.	Hold the rolled-up gauntlet tightly in one hand.	
4.	Squeeze the palm of the glove with the other hand as to put the confined air under pressure (gently, as not to pop the glove).	
5.	If any puncture exists, you will detect it by the air escaping or the hole will be visible.	
6.	If there is a hole, don't use the glove, and get another pair.	

Poisoning can happen to you in many ways in the work area, but some of the most frequent causes are from ingesting (eating, swallowing) and inhalation (breathing) of the poison.

Ingestion

One of the most overlooked and yet common forms of poisoning is ingestion poisoning. The chemicals that you are using can be splashed into your mouth while washing airplanes, cleaning components, having dirty hands, or by the most frequent method, eating around a work area. Ingesting caustic or poisonous chemicals can burn or damage your mouth, esophagus, lungs, liver, or stomach.

Guidelines to Avoid Ingestion Poisoning

By taking a few common sense precautions you will be able to avoid ingestion poisoning. Such as:

- Do not eat around a work area
- Ensure that your hands and arms are cleaned with soap and water
- Clean you face from oils, chemicals, dust and particles
- Also ensure that you remove your coveralls or any other protective clothing that you are wearing before entering your eating area

Inhalation

Every time you breathe, you inhale some type of chemical, and in a shop situation this can be dangerous. Solvents, paints, chromates, dust, and fumes can cause a variety of health problems. Your best protection from this is using the proper respiratory protection. Look in the MSDS for the required type of protection.

The use of respirators in the Coast Guard is mandatory for any work that might affect the respiratory system. Respirators are used in operations ranging from sand blasting, cleaning, to painting. Each type of respirator has a specific filtering function. Filters are not universal in their filtering capabilities. Each type of filter is designed for certain types of chemicals and environmental conditions.

Guidelines For Selecting Filters

For selection of the proper filter read the MSDS for the chemical and/or the technical order/ACMS MPC for the job at hand. When in doubt, ask your supervisor or the Respiratory Program Coordinator at your unit for guidance.

Respiratory Program Coordinator (RPC)

The Respiratory Program Coordinator (RPC) is responsible for the following actions:

- The correct respirators are used IAW NIOSH/MSHA standards.
- Self contained and supplied air systems deliver air which meets breathing air standards.
- Periodically observes and evaluates the actual use of respirators by unit personnel.

5.D.01c Coast Guard Policy On Respiratory Protection (Continued)

Responsibility of The Supervisor

It is the supervisor's responsibility to assure the proper use of respirators during operations or activities and that the respirators are:

- Available
- Cleaned
- Stowed properly after use

Responsibilities of The Technician

It is the responsibility of the technician to use the provided protection IAW the instructions and training received and to do the following:

- Inspect the respirator before and after each use.
- Report to the supervisor situations which may require respirator use and those in which respirators are not being used as required.
- Clean and maintain respirators as directed
- Stow properly after use

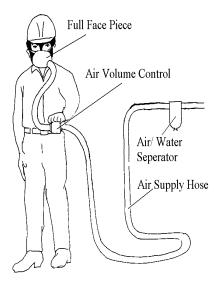
There are various types of respirators used in aviation today. Choosing the proper respirator for the task at hand is extremely important.

Categories of Atmospheric Supply Respirators

Atmospheric supply respirators have their own air source or supply of air into the respirator face piece. These types of respirators are used in spaces that have little or no clean, breathable air in the compartment (like fuel cells and paint booths). There are two categories:

- Self-contained breathing apparatus (SCBAs) which supply air from a source (typically a cylinder) carried by the user.
- Supplied-air respirators (SARs) which supply air from a source (usually an air compressor) located some distance away and connected to the user by an air supply hose.

Illustration of a Supplied Air-Respirator Below is an illustration of a typical supplied-air respirator.



Parts Function Table

Below is a parts function table for the atmospheric supply respirator.

Part	Function
Full Face Piece	Covers the whole face of the wearer and offers limited eye protection
Air Volume Control	Regulates air-flow to the mask
Air Supply Hose	Provides clean filtered air to the user from the supply source
Air/Water Separator	Separates the water from the air to provide the user with dry air

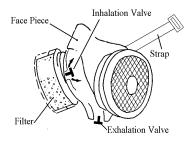
Air-purifying respirators do not have a separate air source. The respirators draw ambient air across a filter or purifying cartridge before the air enters the face piece.

WARNING

Air-purification filters will be used only where the oxygen level concentration is 19.5% or higher.

Diagram of an Air-Purifying Respirator

Below is a view of a typical air-purifying respirator used within the Coast Guard today.



Parts Function Table

Below is a parts function table for the above air-purifying respirator.

Part	Function
Filter	Filters out contaminates
Face piece	Provides sealing surface between the face and the filter
Strap	Holds the face piece snugly in position
Exhalation Valve	Exhaled air escapes without letting contaminated air in
Inhalation Valve	Located behind the filter, this one way check valve allows filtered fresh air in and closes while the user exhales

Respirators do not work properly unless they fit the wearer. The quality of the respirator fit is determined by the seal where the respirator meets the wearer's face.

Approved Types of Respirators

Approval ratings required for all respirators used in the Coast Guard are provided by the following organizations:

- Mine Safety and Health Administration (MSHA)
- National Institute for Occupational Safety and Health (NIOSH)

Definition of Fit Testing

The fit test is performed by using a small smoke irritant such as isoamyl acetate, or saccharin solution and gently waving it around the mask. The user should not be able smell the offending chemical if the respirator is properly fitted.

Policy For Fit Test

All personnel who use air-purifying respirators shall undergo a respirator fit test.

Negative Pressure Check

The negative pressure check is used to see if the wearer has a properly fitted respirator. This shall be done every time the respirator is placed on the face prior to being exposed to the hazard.

Negative Pressure Check Procedures

To properly accomplish a negative pressure check use the following procedures:

Step	Action
1.	Properly place the respirator on your face
2.	Tighten the face piece straps snugly
3.	Cover the filtering cartridge inlet with the palm of your hands (air-purifying) or pinch the hose (air-supplied)
4.	Gently inhale and hold your breath for about 10 seconds. The mask should squeeze against your face and hold a vacuum (if not start over at step 1)

5.D.01c How to Conduct A Respirator Positive Pressure Fit Check

Positive Pressure Check

This check is used on respirators equipped with tight fitting face pieces which contain both inhalation and exhaust valves such as the self-contained breathing apparatus.

Positive Pressure Check Procedures

To properly accomplish a positive pressure check use the following procedures:

Step	Action
1.	Secure the source of air
2.	Properly don the face piece
3.	Tighten the face piece straps snugly
4.	Cover up the exhaust valve with the palm of your hand or pinch the tube closed
5.	Exhale gently for at least 10 seconds. The mask should bulge out slightly with no escape of air (if not start over at step 1.

Purpose

The purpose of the daily fit check or pre-use check is to ensure that the respirator is in good working order prior to doing any work.

Pre-use Checks Procedure

These checks shall be performed before putting on the respirator each time that it is worn. Examine the face piece for:

Step	Action	
1.	Excessive dirt (clean if required)	
2.	Cracks, tears, holes or physical distortion	
3.	Inflexibility of rubber face piece	
4.	Cracked or torn check valves	
5.	Straps in good repair	
6.	Filter cartridge holder is not damaged, gaskets in place	
7.	Choose correct filter for the task at hand (see MSDS)	
8.	Filter is installed correctly	
9.	Pressure test the face piece (negative or positive testing)	

Respirator care is an essential part of this program. Without the proper care and cleaning of respirators, they will be rendered useless.

Maintenance and Repair

Maintenance and repair of respirators must be done by thoroughly trained personnel.

WARNING

Do not interchange replacement parts between different brands or manufacturers. Such substitutions of parts or modifications will invalidate the MSHA/NIOSH approval of the respirator.

Reason for Cleaning

Use of the respirator results in the exterior surface becoming dirty and/or contaminated. The interior surface is exposed to sweat and other body secretions which can, over a period of time, cause dermatitis. In addition, the use of the same respirator by different people may lead to the transmission of skin conditions between wearers and/or dermatitis.

Cleaning Guidelines

Follow the manufactures recommendations for disassembly and cleaning. If they are not available use the cleaning guidelines published in the Technical Guide: Practices For Respiratory Protection, COMDTINST M6260.2 (series).

Storage Policy for Respirators

After the respirators are cleaned they must be stored properly. Store respirators:

- In a clean, dry location
- Away from direct sunlight
- Separated from chemical contaminates
- In clean plastic bags until re-issue
- In a single layer with the face piece and the exhalation valve in an undistorted position to prevent rubber or plastic from distorting

The Coast Guard's living and working environment contains many high intensity noise sources. Exposure of personnel to such noise, damages hearing and creates major health and fiscal impacts on Coast Guard resources, resulting in reduced mission capability.

Definition of Hearing Loss

The ear responds to excessively loud noise over time, with the high pitch of hearing affected first. Therefore, early hearing loss is not noticeable and may go undetected by the individual for many years.

Consequences of Loud Noise

If the noise level to the ear is not decreased, a person will eventually lose the ability to hear speech. This damage is permanent.

Personal Responsibility

Ensuring that the hearing conservation program is successful is shared by the individual and the various levels in the Coast Guard organization. Ultimately the success of the hearing conservation program is your responsibility. You are always responsible for the following:

- Always practice good hearing conservation both at work and at home.
- Notify your supervisor of any unhealthy or unsafe working conditions or noise hazards.

Definition of Noise

Noise is sound without value. It is the phenomenon of sound waves moving through air in much the same way ripples travel on an undisturbed pond.

Definition of Decibel

Intensity of sound is commonly known as loudness and is measured in units called decibels dB(A). A zero on the decibel scale represents the lowest limit of human audible perception; the level of normal conversation is approximately $60 \ dB(A)$.

Noise is a part of everyday life and comes from a myriad of sources. The most thought of noise sources are often associated with that of an industrial source.

Examples of Common Noise Sources

An example of common noise sources are hanger decks, flight lines, or in an aircraft. In reality you have the same risk, if not more, in a home environment. Noise from you lawn mower, chain saw, weed eater, and yes, even your stereo CD player with head phones.

Physical Effects of Over Exposure to Noise

Noise can cause a lot of physical problems with you and your health. The severity of the problems depends on the level and the duration of exposure. Without proper hearing protection, the following symptoms can be caused by noise.

- Light headedness
- Dizziness
- Headaches
- Fatigue
- Dilation of blood vessels
- Rise in blood pressure
- Change in heart rate
- Nausea
- Rise in the blood cholesterol level

First Aid for Over Exposure to Noise

If you notice anyone showing signs of over exposure to noise immediately remove them from the noise and get medical help ASAP.

Long term Effects of Noise

Long term exposure can cause permanent and often non-reparable damage to your ear. This can not only affect your health, but your career.

Hearing Conservation Program

This program is used to continually monitor a member who shows signs of hearing loss. When placed on this program, and there is no substantial improvement in your hearing within a prescribed time you can be grounded indefinitely. For further information and details see your medical department. Do not take chances. Wear the prescribed hearing protection.

Hearing protection devices come in a wide variety of shapes and designs but they have the same goal, to lower the input of noise to your ear.

Types of Hearing Protection

Each type of hearing protection is rated a different Noise Reduction Rating (NRR), so it might be necessary to wear two sets of different types of protection. Ear protection comes in the following forms:

- · Foam ear plugs
- Rubber (double, triple) flanged plugs (must be fitted by medical department)
- Formed plastic ear plugs (see the medical department)
- Head sets (commonly called Mickey Mouse ears)

Ear Protection Charts

Ear protection is required whenever you know you will encounter noises greater than (>) 84 dB(A). The higher and longer the duration that you encounter, the more protection you will need. Follow the below chart for your hearing protection needs.

dB(A)	No Protection	Protection Time
>84	0 Seconds	Unlimited
>100	0 Seconds	Unlimited
>104	0 Seconds	Double hearing protection required after >104
>110	0 Seconds	Unlimited
>120	0 Seconds	4 Hours MAX
>130	0 Seconds	1 Hour MAX
≥140	0 Seconds	5 Minutes MAX

Correct Ear Plug Placement

The proper insertion and placement of ear plugs is important for them to offer optimal protection. Read the manufacturers instructions prior to using the ear plugs.



Double Hearing Protection

It is always a sure bet to err on the side of safety and wear double hearing protection. The wearing of ear plugs and head sets will offer the best first line of protection. Do not take a chance with your hearing.

The purpose of hearing protection is to lower the input of noise into your ear. To accomplish this, the protection device is made of material which absorbs sound waves. The various materials used absorb sound waves at different rates.

Definition of Noise Reduction Rating (NRR)

The noise reduction rating (NRR) is what determines the effectiveness of the hearing protection. The NRR is shown on the package that the hearing protection comes in. This number will help you to determine if the hearing protection that you have chosen is adequate or if you need to augment the protection. The higher the NRR the better the hearing protection offered.

NRR Example

The noise reduction rating (NRR) of hearing protection is simply figured out by finding out the decibel rating (or reading) and subtracting the NRR of the hearing protection that you have chosen. For instance, the decibel rating for a paint both was calculated at 95dB(A) by the an industrial hygienist. The ear plugs that your shop normally uses have a NRR of 30 dB(A).

95 dB(A) Paint booth noise rating
- 30 dB(A) NRR Ear plugs
65 dB(A) Hearing exposure level to you

This is well below the $\geq 84dB(A)$ rating, which means you have good hearing protection for the task at hand.

Purpose

First Aid consists of emergency treatment of an injured or wounded person. The purposes of first aid are to:

- Save the victim's life,
- Prevent further injury or unfavorable progression, and
- Preserve the vitality and resistance to infection.

Basic First Aid Procedures

The Coast Guard has trained you in basic first aid IAW the Syllabus of First Aid and Lesson Plan, COMDTINST M6000.3 (series) and you as a member of the Coast Guard and as a shop supervisor should know these procedures. There are four basic steps in first aid that you should remember. If you find a victim in need of first aid perform the following steps:

Step	Action	
1.	Call or send for help	
2.	Remove the cause or the victim from the cause	
3.	Perform the ABC'S:	
	Airway: ensure that the airway is clear	
	Breathing: verify whether the victim is breathing	
	Circulation: check for pulse and discoloration perform CPR if necessary	
	• Shock: treat for shock if necessary	
3.	Seek medical treatment immediately, and/or report the injury to the unit safety officer	

First Aid Treatment Rationale

Never hesitate to get medical care as soon as possible or call for assistance. You are not a doctor. No one has ever gotten in trouble for playing it safe, let the doctors make the judgment call.

The eye can be injured in many ways. Eye injuries range from impact to intrusion of a chemical or an object. With any eye injury seek medical help as soon as possible.

Intrusion

This is the most common type of an eye injury in an industrial area. The eye is injured from a particle or an object that punctures the eye or creates a deep scratch.

WARNING

Never attempt to remove an object embedded in to the eyeball or has penetrated the eyeball. Seek medical help immediately.

Splash

This eye injury is caused by a chemical being splashed into the eye. This often occurs while washing aircraft or while using solvents in a parts cleaning tank. Read the MSDS or the label on the container for further instructions on how to flush the eye. When taking someone to medical, if at all possible, take the container with you.

WARNING

Flush the eye out immediately for at least 15 minutes with fresh clean water away from the nose to prevent flushing the chemicals into the unaffected eye. Seek medical help immediately.

As an AMT you will have the chance to work on electrical equipment, therefore it is essential that you have an understanding of basic electrical safety. All electrical or electronic equipment should be considered dangerous with the potential to kill. It is impossible to cover every safety situation that you may encounter on the job.

Personal Responsibilities

It is your responsibility to familiarize yourself with the electrical safety guidelines and practices located in the Electronics Manual, COMDTINST M10550.25 (series).

Intentional Electrical Shock

Never intentionally give yourself an electrical shock from a battery, capacitor, or a megger (a low voltage output power supply).

Definition of Electrical Shock

An electrical shock is the result of a person coming into contact with an energized electrical wire or circuit and resulting in a flow of electrical current through the body. The severity of the shock is based on many factors which add to or subtract from its intensity.

Example of Electrical Shock

The following is an example of a victim who received an electrical shock. A technician working on an aircraft's 24 VDC electrical system (who did not disconnect the aircraft's battery) soon found out that by accidentally bridging the gap of a starter cable and grounding it to the metal airframe with a screwdriver, makes for a painful reminder.

Conditions For an Electrical Shock to Occur

There are two conditions that must be present in order for current to flow through an individual's body resulting in an electrical shock. They are as follows:

- First, some part of the body, must form part of a closed circuit.
- Second, there must be a difference in potential to cause current to flow through the circuit.

Current flow depends on the electrical resistance of the circuit path through the victim's body. Human skin resistance can range from a few hundred ohms when wet, to well over 500,000 ohms when dry.

In order for your body to register an electrical shock, there must be some current flow.

The Effects of Current Flow Table

The table below shows the general effects of current flow through the human body.

Current in milliamperes	Effects on the body
0	None
3	Mild tingling
10	Painful (gets your attention)
25	Very painful (you can't let go)
60	Severe (breathing difficulty)
140	Usually fatal (heart twitches)
200	Burning odor (heart clamps)

Electrical shock is an ever present yet avoidable aspect of working on aircraft. Unfortunately, the occasional accident happens, and you need to be prepared.

Signs and Symptoms of a Serious Electrical Shock

The victim of a serious electrical shock may have any or all of the following signs or symptoms:

- Burns where the current flow entered and/or exited the body
- Nerve damage (paralysis)
- Muscle tenderness and or twitching
- Breathing difficulty (the tongue may swell and obstruct the airway)
- Irregular heartbeat or cardiac arrest
- Blood pressure may be elevated or lowered
- Restlessness/irritability or loss of consciousness
- Visual difficulties
- Seizures
- Secondary injuries (cuts, bruises, broken bones, etc.)

Secondary Electrical Injuries

Often, secondary injuries are sustained from an electrical shock as a result of surprise, and are sometimes in themselves fatal. Such as:

- Burns
- Falling off work stands
- Thrown into another live circuit

Purpose

Personnel suffering from electrical shock must be removed from the hazard as soon as possible. Depending on the amperage or the duration of the electrical shock, the chances of the victim's survival is in your hands. Acting quickly and ensuring your safety is essential to you and the victim.

Rescuing Electrical Shock Victims Table

The following table lists the steps for rescuing electrical shock victims:

WARNING

High amperage can cause the victim to hold on to the source of power. Do not touch the victim without securing the source of power or without using *DRY* rescue equipment

Step	Action	
1.	Call, or send for help	
2.	Remove the cause or the victim from the cause by securing the power by using a suitable dry non-conductive object (wooden cane or dry blanket)	
3.	Pull the victim from the source of power	
4.	Check for the ABC'S	
	• Airway	
	• Breathing	
	Circulation	
	Shock (treat if necessary)	
5	Seek medical treatment immediately, and/or report the injury to the unit Safety Officer	

Electromagnetic radiation (RF) from radar, and communication transmitters are hazardous and cause undesirable effects under certain conditions.

Categories of Radiation Hazards

Generally, these radiation hazards fall into one of the following categories:

- Induced voltage effects
- Personal biological injury

Personal Biological Injury

When electromagnetic energy is absorbed by human tissues, heat is produced. The body cannot dissipate this heat as fast as it is produced, therefore the internal temperature of the body will increase causing damage to tissue and internal organs.

Example of Biological Injury

Microwave ovens demonstrate perfectly how energy is absorbed by biological tissue. Though there is no heat transferred from the electronics source to the tissue, the tissue absorbs the energy and heats up internally. This is fine for ground round, but not so good for living human tissue.

RF Sources

RF sources come from various aircraft and hanger equipment. They are:

- High Frequency antennas (HF)
- Radar dishes
- Side Looking Airborne Radar (SLAR)

Signs of RF Exposure

While working on the hanger or out on the ramp you could be inadvertently exposed to RF radiation. Some of the most common signs of RF exposure are:

- Your eyes have the sensation of having sand in them
- Skin starts tingling (cooking)
- Skin starts feeling warm
- Electrical shock (if you touch the antenna)

NOTE

If you have been exposed to, or think you have been exposed to RF radiation, seek medical help at once.

Body Organs Most Sensitive to RF Radiation

Exposure to RF radiation can have damaging, long lasting, and even permanent damage to your body. The most RF sensitive organs of the human body are the:

- Eyes
- Testicles

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w	uc		u		-

Answer the following questions on General Shop Safety.

State the manual used to estal for all Coast Guard aviation is	olish safety standards and procedures maintenance facilities.
State the standard for instruct the Coast Guard.	ing, on the subject of safety within
3. Match the name in column A column B. Use each letter on	with the appropriate statement in
<u>Column A</u>	<u>Column B</u>
1. Acute 2. Chronic	 Repeated exposure over a prolong period of time
	b. Exposure limit is not a factor
	c. Exposure over a short period

Questions
(continued)

	the responsibility of the technician in the Coast Guard tory protection program.
hey a	wearing an air-purification respirator you must ensure being used in areas where the oxygen concentration percent.
hey a	re being used in areas where the oxygen concentration
they a	re being used in areas where the oxygen concentration percent.
they a	re being used in areas where the oxygen concentration percent. 5
A. 3. C. 19	re being used in areas where the oxygen concentration percent. 5 9 2.5
A. B. C. 19 D. 29.	re being used in areas where the oxygen concentration percent. 5 9 2.5
A. B. C. 19 D. 29. All reservequire	re being used in areas where the oxygen concentration percent. 5 9 2.5 92 epirators used in the Coast Guard must meet the

Scholar Shop	Ouroty	con quiz (continued)	0.0.
Questions (continued)	8.	State the warning associated with the maintenance of respirators.	and repair
	9.	Who is ultimately responsible for the success of the	e hearing

conservation program?

10. List the symptoms	of a person	who has been	exposed to
excessive noise?			

a.)	

b.)

11. If a person is showing signs of being over exposed to noise	
what should your first aid response be?	

3.0.010	General Shop Safety Sen-Quiz (Continued
Questions (continued)	12. At what decibel level is hearing protection required?
	13. Define: Noise Reduction Rating (NRR).
	14. What two conditions must be present to result in electrical shock?
	a)
	b)
	c)

What is a	secondary	electrical	injury?	

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Feedback

Compare your answers to the feedback provided below. If you had trouble with the Self-Quiz, please review the appropriate section of this reading assignment.

Questions	Answers	Reference
1.	Coast Guard Aeronautical Engineering Maintenance Management Manual COMDTINST M13020.1 (series)	5
2.	When instructing, only teach safety procedures and techniques that are 100% safe and IAW Coast Guard regulations.	6
3.	1. c 2. a	14
4.	Your hands feel dry and chapped due to the loss of natural oils in your hands.	15
5.	It is the responsibility of the technician to use the provided protection IAW the instructions and training received.	20
6.	С	23
7.	 a. Mine Safety and Health Administration (MSHA) b. National Institute for Occupational Safety and Health (NIOSH) 	24

Feedback (Continued)

This is a continuation of the feedback table on the proceeding page.

Question	Answer	Reference
8.	Do not interchange replacement parts between different brands or manufacturers. Such substitutions of parts or modifications will invalidate the MSHA/NIOSH approval of the respirator.	28
9.	Ultimately the success of the hearing conservation program is your responsibility.	29
10.	Light headedness	30
	• Dizziness	
	Headaches	
	Fatigue	
	Dilation of blood vessels	
	Rise in blood pressure	
	Change in heart rate	
	• Nausea	
	Rise in blood cholesterol	
11.	Immediately remove them from the noise and get medical attention ASAP.	32
12.	>84 dB(A)	32
13.	Determines the effectiveness of hearing protection.	34

Feedback (Continued)

This is a continuation of the feedback table on the proceeding page.

Question	Answer	References
14.	a. Some part of the body must form part of a closed circuit.	37
	b. There must be a difference in the potential to cause current to flow through the circuit.	
15	140 milliamperes	38
16.	Injuries that are sustained from electrical shock as a result of surprise, and are sometimes in themselves fatal.	39

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Syllabus 5.D.01c

Performance

INSTRUCT personnel in shop safety procedures.

Performance Objective 1

Given the applicable publications, **PREPARE** a training session on shop safety IAW:

- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)
- Safety and Environmental Health Manual, COMDTINST M5100.47 (series)
- Technical Guide: Practices For Respiratory Protection COMDTINST M6260.2 (series)
- Hazardous Waste Management Manual, COMDTINST M16478.1 (series)
- First Aid and Health Lesson Plans COMDTINST M6000.3 (series)

Performance Objective 2

Given the applicable publications, **PRESENT** a training session on general shop safety IAW the Military Requirements For Becoming a Senior Petty Officer MRNSPO 0458 (series).

			Ø.

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Objectives

To successfully complete this assignment, you must study the text and master the following objectives:

- **DEFINE** the term "eddy currents".
- **DESCRIBE** the nature of eddy currents.
- **STATE** how the magnetic field is generated during eddy current testing.
- LABEL the parts of an eddy current generation diagram.
- **DESCRIBE** how flaws are detected when eddy currents are induced into metal.
- **MATCH** the following eddy current test instrument components with their function:
 - Oscillator
 - Test Coil
 - Bridge
 - Signal Processing Circuits
 - Readout
- **MATCH** the following types of signal processing circuits with their function:
 - Amplifying
 - Filtering
 - Phase detection and Phase discrimination
- **MATCH** the following eddy current test instrument functions to their descriptions:
 - Generating
 - Receiving
 - Displaying
- **STATE** the criteria for eddy current test instrument selection.
- **STATE** the caution to follow when using eddy current test instruments.

Objectives (Continued)

- **STATE** the warning to follow when performing an eddy current inspection.
- **LIST** the safety hazards to eliminate prior to starting an eddy current inspection.
- **LIST**, in order, the three general performance steps of an eddy current inspection.
- **LIST** the general cleaning guidelines for cleaning an inspection area.
- **STATE** the proper scanning technique for a test area.
- **IDENTIFY** the definitions of the following terms:
 - Probe wobble
 - Lift-off
- **LIST** the causes of lift-off.
- **STATE** the meaning of the following meter needle deflections:
 - Sharp
 - Minor
- STATE the caution to follow when interpreting meter readings.

References

The information contained in this assignment can be found in the following references:

- Nondestructive Inspection Methods, AFTO 33B-1
- Nondestructive Inspection Procedures, AFTO 1C-130A-36
- Eddy Current Tester, AFTO 33B2-9-1
- Flaw Detector, Eddy Current, AFTO 33B2-7-11

Overview 5.D.01

Introduction

This reading assignment is an introduction to eddy current theory, equipment, and general inspection procedures. Always refer to the applicable maintenance publications to perform eddy current inspections.

How to Attend Advanced Training

Advanced eddy current nondestructive inspection training is available. See the Leading Chief Petty Officer at your unit for more information if you are interested in attending this training.

In This Assignment

This assignment contains the following:

Page
4
5
7
8
9
10
11
12
15
16
17
24
27

Definition of Eddy Currents

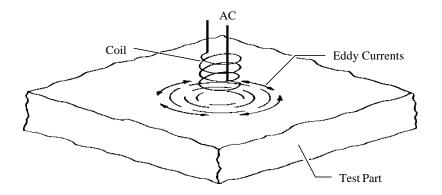
Eddy Currents are electrical currents induced in a conductor of electricity by reaction with a magnetic field.

Nature of Eddy Currents

Eddy currents are circular in nature, and their paths are oriented perpendicular to the direction of the applied magnetic field. In general, during eddy current testing, the magnetic field is generated by an alternating electrical current (AC) flowing through a coil of wire.

Eddy Current Generation Diagram

The following diagram shows the generation of eddy currents:



Flaw Detection

When eddy currents are induced in a metal in the region of a crack or other flaw, the eddy current flow is distorted. The distortion results in a change of magnitude and distribution of the eddy currents. By monitoring the changes in eddy currents, the presence of cracks or flaws can be established.

Components

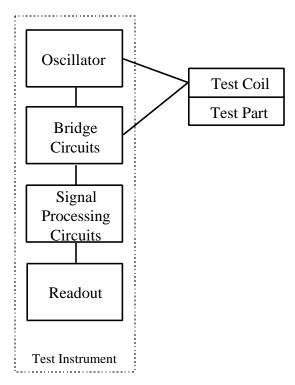
In its simplest form, the eddy current test instrument consists of the following components:

- Oscillator
- Test Coil (probe)
- Bridge Circuit
- Signal Processing Circuits
- Readout

Except for the test coil, all these components are integral to the test instrument.

Inspection System Block Diagram

The following is a block diagram of the eddy current inspection system:



5.D.01 Eddy Current Inspection System Components (Continued)

Oscillator

The oscillator provides an alternating current or specified frequency range to the test coil. The frequency used is based upon the intent of the inspection and the type of the material being inspected. Frequencies for eddy current inspection may vary from less than 100 Hz to greater than 6 MHz.

Test Coil (Probe)

The test coil (probe) serves to introduce a varying magnetic field into the part being inspected. In addition, this same coil usually functions as a detector of changes in eddy current flow. Test coils may vary widely in size and shape as required for the application.

Bridge Circuit

The bridge circuit converts changes in eddy current magnitude and distribution into signals for subsequent processing and display. A change in current flowing through the test coil unbalances the bridge circuit. This action is relayed as a signal to the subsequent circuits.

Signal Processing Circuits

The processing of the signal from the bridge circuit depends on the type of information to be displayed. The following table shows the function of different types of signal processing circuits:

Circuit Type	Function
Amplifying	Employed in all eddy current units to increase the strength of the signal for readout.
Filtering	Suppress unwanted signals from conditions for which inspection is not required.
Phase detection & phase discrimination	Eliminate, separate, or analyze the response of various specimen properties and test conditions.

Readout

The common form of eddy current signal display is the meter. Most small, portable units present information in this manner.

Test Instruments 5.D.01

Purpose

Eddy current test instruments are used at air stations to locate cracks and crack-like defects in aircraft parts.

Description

Eddy current test instruments have the following common physical characteristics:

- compact
- self-contained
- lightweight
- portable

Test Instrument Functions

The following table shows the three basic functions of an eddy current test instrument:

Function	Description
Generating	Provides an alternating current to the test coil.
Receiving	Processes the signal from the test coil to the required form and amplitude for display.
Displaying	Displays the test results visually and/or audibly.

Other Names for Test Instruments

Eddy current test instruments are also referred to by other names such as flaw detector, test unit, or tester.

Test Instrument Use

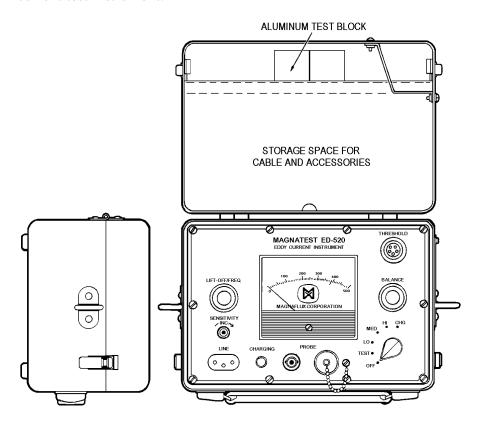
The aircraft type and inspection application will determine the eddy current instrument to be used.

CAUTION

Improper use of the eddy current test instrument may produce inaccurate readings and result in a flawed component remaining on an aircraft. Always follow the step-by-step set up and operating procedures listed in the applicable aircraft maintenance publications when using eddy current test instruments.

Magnaflux Model ED-520

The following example shows a Magnaflux model ED-520 eddy current test instrument:

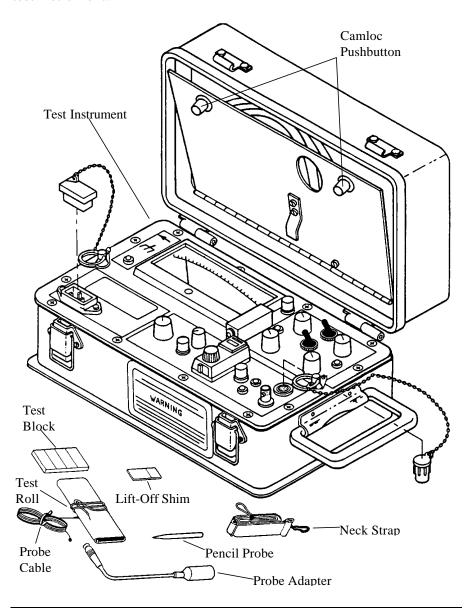


For More Information

For more information about the Magnaflux model ED-520 Eddy Current test instrument refer to AFTO 33B2-9-1 (NAVAIR 17-15C-136).

Hocking Model UH-B

The following example shows a Hocking model UH-B eddy current test instrument:



For More Information

For more information about the Hocking model UH-B Eddy Current test instrument refer to AFTO 33B2-7-11.

Eddy current inspection is effective for the detection of surface or near surface cracks in most metals. The method can be applied to airframe parts or assemblies where the inspection area is accessible for contact by the eddy current probe.

Safety Precautions

Safety precautions for eddy current testing will always be stated in the applicable maintenance publication. The following are examples of some general precautions commonly found.

WARNING

Electrical equipment shall not be operated in areas where combustible gases or vapors may be present, unless the equipment is explosion proof.

Prior to conducting an eddy current inspection, survey the general area in advance to eliminate possible hazards created by:

- loose structures
- support equipment
- electric cords
- toxic fluids
- fumes

Eddy Current Inspection Steps

The following table lists the general steps for performing an eddy current nondestructive inspection.

Step	Action
1	Clean the test area.
2	Inspect the test area.
3	Evaluate the test results.

Prior to inspecting an area, the area must be cleaned. The cleaning technique to be used will be determined by the type of foreign matter present and whether the part is plated, painted, or has a protective coating.

The applicable maintenance publication for a given eddy current inspection procedure will provide the specific guidelines to prepare an inspection area for testing.

General Cleaning Guidelines

The following list states general guidelines that should be followed when cleaning an eddy current inspection area:

- Remove all foreign matter and corrosion.
- When removing protective coatings, use a method that will not affect, cause damage, or mask any defects.
- Do not use cleaning methods which mechanically abrade the surface of the area to be inspected since this may cause damage or mask the surface of the area.
- Mask off areas that may be damaged by contact with removal solutions or mediums.

Inspecting a test area consists of instrument calibration and proper scanning techniques.

Test Instrument Calibration

Calibration is the standardization of the test instrument, prior to testing, to a known reference value. This is accomplished by following the step-by-step procedures outlined in the applicable maintenance publications for the given application.

The calibration steps required will vary depending on the:

- test instrument type
- test area material properties

Scanning the Test Area

The inspection is accomplished by scanning the test area with the instrument probe. To ensure proper crack detection, the probe must be moved with consistency over the surface. Keeping the probe in contact with, and as perpendicular to the surface as possible, while scanning prevents "probe wobble".

Probe Wobble

Probe wobble is the angular change that occurs when the probe is moved along a surface. When scanning with a probe, it is usually impossible to maintain the probe at the same angle as position is changed. In some instances holders may be fabricated to guide the probe and hold the angular relationship to the surface.

Lift-Off

Lift-off is the change in spacing between the probe and the inspection surface. Any change in contact with the inspection surface can cause variations in the meter readings. Lift-off is caused by the following:

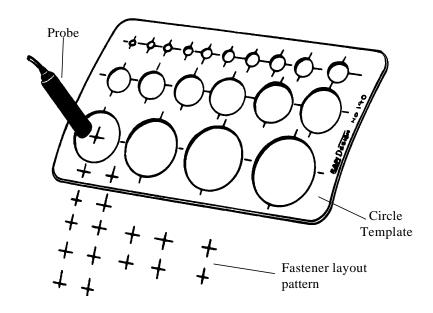
- probe wobble
- probe bounce
- inconsistent thickness of nonmetallic coatings (paint, primer, ect.).

Probe Scanning

Probe scanning procedures vary, depending upon the specific inspection steps required by the applicable maintenance publication.

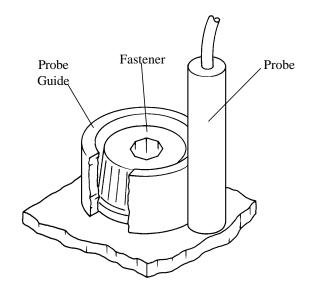
Example 1, Scanning

The following example shows a scan around fasteners using a circle template.



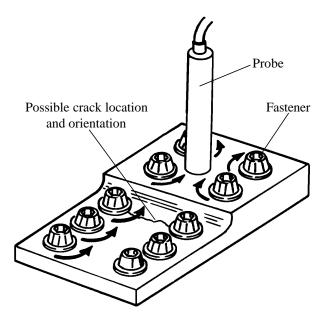
Example 2, Scanning

The following example shows a scan using a fastener probe guide.



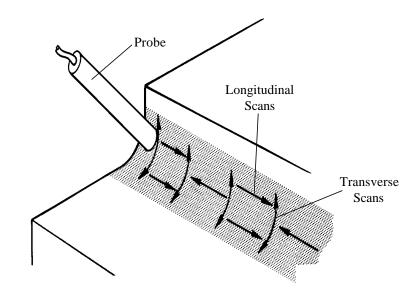
Example 3, Scanning

The following example shows a scan between fasteners.



Example 4, Scanning

The following example shows multidirectional scans of a curved surface.



Evaluating the test results consists of observing the meter readout as the surface is scanned and listening for instrument audible warnings (if available).

Reading the Meter

Flaws in the test area will be indicated on the meter. Observing the speed and amount of movement of the meter needle deflection will indicate the type of flaw being scanned. Generally, sharp and minor deflections are the type most often observed.

- **Sharp** needle deflection: usually indicates a crack.
- **Minor** needle deflection: caused by changes in conductivity of the metal.

Rejection Criteria

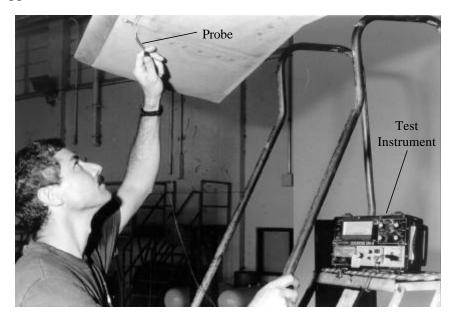
Allowed limits for rejection of a test component is always stated in the maintenance publication for the applicable eddy current inspection.

CAUTION

Inaccurate interpretation of eddy current test instrument meter readings may result in a flawed component remaining on the aircraft. Always present questionable test results to the attention of your supervisor.

Application Illustration

The following illustration shows an eddy current inspection application:



For More Information

For more general information about Eddy Current nondestructive inspections, refer to the following references:

- Nondestructive Inspection Methods, AFTO 33B-1-1 (NAVAIR 01-1A-16), Chapter 3
- Aviation Structural Mechanic (H & S) 3 & 2, NAVEDTRA 12338, Chapter 15
- FAA Airframe & Powerplant Mechanics General Handbook, AC65-9A Chapter 10

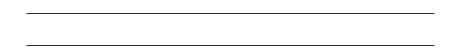
Questions

Answer the following questions on Eddy Current NDI:

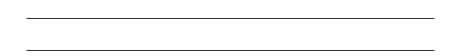
1. What is the definition of eddy currents?



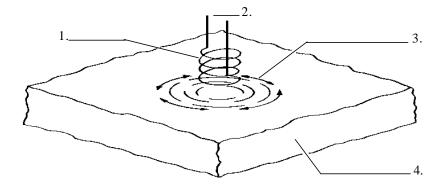
2. What is the nature of eddy currents?



3. How is the magnetic field generated during eddy current testing?



4. Label the components of the following eddy current generation diagram.



5. How are flaws detected when eddy currents are induced in metal?

Questions (Continued)

6. Match the test instrument components in column A with their function in column B.

Column A			<u>Column B</u>
1.	Oscillator	a.	The common form of eddy current signal display.
2.	Test Coil	b.	Provides an alternating current or specified frequency range to the test coil.
3.	Bridge Circuit	c.	Processes the signal from the bridge circuit.
4.	Signal Processing Circuits	d.	Coverts changes in eddy current magnitude and distribution into signals for subsequent processing and display.
5.	Readout	e.	Introduces a varying magnetic field into the part being inspected.
		f.	Suppresses frequency variations

7. Match the signal processing circuits in column A with their functions in column B.

Column A Column B ____1. Amplifying a. Employed in all eddy current units to increase the strength of the signal for readout. ____2. Filtering b. Eliminate, separate, or analyze the response of various specimen properties and test conditions. _3. Phase detection c. Suppress unwanted signals from and phase conditions for which inspection is not required. discrimination d. Provides visual or audio test results.

Questions	
(Continued))

8. Match the test instrument functions in column A with their descriptions in column B.

Column A				Column B		
	1.	Generating	a.	Processes the signal from the test coil to the required form and amplitude for display.		
	2.	Receiving	b.	Provides an alternating current to the test coil.		
	3.	Displaying	c.	Provides visual or audio test results.		
			d.	Processes the signal from the bridge circuit.		
9.	What	criteria detern	nines	s the test instrument selection?		
10.		caution must juments?	you l	be aware of when using eddy current test		
11.		warning must	you	follow when performing an eddy current		

Questions (Continued)	12. List below the safety hazards you must eliminate prior to starting an eddy current inspection.
	·
	13. List below, in order, the three general performance steps of an eddy current inspection.
	1)
	2)
	3)

Questions (Continued)	14. List below the general cleaning guidelines for cleaning an inspection area.
	15. What is the proper scanning technique to use while scanning a test area?
	16. When the probe is moved along a surface, the angular change tha occurs is called
	17. The change in spacing between the probe and the inspection surface is called

Questions (Continued)	18. List below the causes of lift-off.
	19. What type of meter deflection usually indicates a crack?
	20. What type of meter deflection is caused by changes in conductivity of the metal?
	21. What caution must you be aware of when interpreting meter readings?

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Feedback

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	Eddy currents are electrical currents induced in a conductor of electricity by reaction with a magnetic field.	4
2.	Eddy currents are circular in nature, and their paths are oriented perpendicular to the direction of the applied magnetic field.	4
3.	By an alternating current (AC) flowing through a coil of wire.	4
4.	 Coil AC Eddy Currents Test Part 	4
5.	When eddy currents are induced in a metal in the region of a crack or other flaw, the eddy current flow is distorted.	4
6.	1. b 2. e 3. d 4. c 5. a	6
7.	1. a 2. c 3. b	6
8.	1. b 2. a 3. c	7

Feedback (Continued)

The following is a continuation of the self-quiz feedback:

Question	Answer	Reference
9.	Aircraft type and inspection application.	7
10.	Improper use of the eddy current test instrument may produce inaccurate readings and result in a flawed component remaining on an aircraft.	7
11.	Electrical equipment shall not be operated in areas where combustible gases or vapors may be present, unless the equipment is explosion proof.	10
12.	Loose structures	10
	Support equipment	
	Electric cords	
	Toxic fluids	
	Fumes	
13.	1) Clean the test area.	10
	2) Inspect the test area.	
	3) Evaluate the test results.	

Feedback (Continued)

The following is a continuation of the self-quiz feedback:

Question	Answer	Reference
14.	Remove all foreign matter and corrosion.	11
	When removing protective coatings, use a method that will not affect, cause damage, or mask any defects.	
	Do not use cleaning methods which mechanically abrade the surface of the area to be inspected since this may cause damage or mask the surface of the area.	
	Mask off areas that may be damaged by contact with removal solutions or mediums.	
15.	The probe must be moved with consistency over the surface; keeping the probe in contact with and as perpendicular to the surface as possible.	12
16.	Probe wobble	12
17.	Lift-off	12
18.	Probe wobble	12
	Probe bounce	
	Inconsistent thickness of nonmetallic coatings	
19.	Sharp	15
20.	Minor	15
21.	Inaccurate interpretation of eddy current test instrument meter readings may result in a flawed component remaining on the aircraft.	15

Syllabus 5.D.01

Performance

INSPECT aircraft components using the Eddy Current nondestructive inspection method.

Performance Objective 1

Given an aircraft component and necessary equipment, **PERFORM** an Eddy Current nondestructive inspection IAW one or more of the following references:

HH-65A

- MPC Index
- 1H-65A-36
- AFTO 33B-1-1 (NAVAIR 01-1A-16)

НН-60Ј

- MPC Index
- A1-H60BB-SRM-200
- AFTO 33B-1-1 (NAVAIR 01-1A-16)

HC-130H

- MPC Index
- 1C-130A-36
- AFTO 33B-1-1 (NAVAIR 01-1A-16)

HU-25A

- MPC Index
- Component Maintenance Manual, 32-40-05
- NAVAIR 04-10-1, Chapter 3
- AFTO 33B-1-1 (NAVAIR 01-1A-16)

Performance Objective 2

Given the results of an Eddy Current nondestructive inspection, **EVALUATE** the results IAW one or more of the following references:

HH-65A
MPC Index
1H-65A-36
AFTO 33B-1-1 (NAVAIR 01-1A-16)

- **HH-60J**
- MPC Index
- A1-H60BB-SRM-200
- AFTO 33B-1-1 (NAVAIR 01-1A-16)

HC-130H

- MPC Index
- 1C-130A-36
- AFTO 33B-1-1 (NAVAIR 01-1A-16)

HU-25A

- MPC Index
- Component Maintenance Manual, 32-40-05
- NAVAIR 04-10-1, Chapter 3
- AFTO 33B-1-1 (NAVAIR 01-1A-16)

Syllabus 5.D.02

Performance

PRESERVE AND DE-PRESERVE aircraft equipment.

Performance Objective

Given various aircraft equipment and the necessary equipment to perform the task, **PRESERVE/DE-PRESERVE** the aircraft equipment IAW one or more of the following references:

HH-65A

- NAVAIR 15-01-500
- NAVAIR 00-80R-19
- 1A-H65A-2-1, Chapter 10
- 1H-65A-11-72-2B2, Chapter 71
- MPC Index, Chapter 72
- COMDTINST M13020.1 (series)

HH-60J

- NAVAIR 15-01-500
- NAVAIR 00-80R-19
- A1-H60CA-GAI-000
- A1-T700A-MMI-200
- COMDTINST M13020.1 (series)

HC-130H

- NAVAIR 15-01-500
- NAVAIR 00-80R-19
- T.O. 2J-T56-56
- MPC Index, Chapters 61 and 85
- COMDTINST M13020.1 (series)

Performance Objective (Continued)

HU-25A

- NAVAIR 15-01-500
- NAVAIR 00-80R-19
- 1U-25A-2, Chapter 10
- MPC Index, Chapters 12 and 71
- COMDTINST M13020.1 (series)

Syllabus 5.D.03

Performance

BUILD-UP an aircraft wheel and tire assembly.

Performance Objective 1

Given an aircraft wheel and tire assembly, and the necessary equipment, **DISASSEMBLE** the wheel and tire assembly IAW one or more of the following references:

- MPC Index, Chapter 32
- AFTO 4T-1-3
- AFTO 4W-1-61
- NAVAIR 04-10-1
- NAVAIR 04-10-506

НН-65А	
НН-60Ј	
НС-130Н	
HU-25A	

Performance Objective 2

Given an aircraft wheel and tire assembly, and the necessary equipment, **INSPECT** the wheel and tire assembly IAW one or more of the following references:

- MPC Index, Chapter 32
- AFTO 4T-1-3
- AFTO 4W-1-61
- NAVAIR 04-10-1
- NAVAIR 04-10-506

НН-65А	
НН-60Ј	
НС-130Н	
HU-25A	

Performance Objective 3

Given an aircraft wheel and tire assembly, and the necessary equipment, **ASSEMBLE** the wheel and tire assembly IAW one or more of the following references:

- MPC Index, Chapter 32
- AFTO 4T-1-3
- AFTO 4W-1-61
- NAVAIR 04-10-1
- NAVAIR 04-10-506

НН-65А	
НН-60Ј	
НС-130Н	
HU-25A	

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Objectives

To successfully complete this assignment, you must study the text and master the following objectives:

- **STATE** the guidelines that should be followed when disassembling an engine.
- **DESCRIBE** the materials and methods that may be used to mark engine parts.
- **STATE** the publication that should be used when inspecting engine bearings.
- **STATE** the guidelines that should be followed when inspecting the following engine internal components/sections:
 - Bearings
 - Carbon Seals
 - Combustion Section
 - Turbine Section
- **DESCRIBE** the different types of damage that may be found in an engine.
- **STATE** the possible cause(s) of the different types of damage that may be found in an engine.
- **STATE** the PRIMARY purpose for cleaning gas turbine engine parts.
- **STATE** the advantages of rigid and fiber-optic borescopes.
- **STATE** the appropriate guidelines to follow when borescoping an engine.
- **STATE** the purpose of nondestructive inspections.
- **IDENTIFY** the characteristics of the different types of nondestructive inspections.

5.D.04 Inspecting Engine Internal Components (Continued)

References

The information contained in this assignment can be found in the following references:

- Aviation Machinist's Mate 3 & 2, NAVEDTRA 12300
- Aviation Structural Mechanic (H & S) 3 & 2, NAVEDTRA 12338, Chapter 15
- Cleaning of Gas Turbine Aircraft Engines and Parts, AFTO 2J-1-13,
- General Electric Aircraft Engines, NAVAIR 02-1-20
- General Instructions, Jet Engine Anti-Friction Bearings, AFTO 44B-1-15
- Maintenance of Aeronautical Anti-Friction Bearings, NAVAIR 01-1A-503,
- Nondestructive Inspection Methods, AFTO 33B-1-1 (NAVAIR 01-1A-16)

2

Overview 5.D.04

Introduction

This assignment introduces you to inspecting engine internal components, which operate at high speeds and/or high temperatures. Under these operating conditions, the internal components are susceptible to various types of damage. Therefore, most turboshaft, turboprop, and turbofan engines are inspected internally on a regular schedule. These scheduled inspections are usually accomplished by using a borescope or disassembling the engine.

In This Assignment

This assignment contains the following:

Subject	Page
Disassembling an Engine for Inspection	5
Marking Engine Internal Components	6
Inspecting Bearings	7
Inspecting Carbon Seals	9
Types of Engine Damage	10
Types of Damage to Compressor Sections	12
Inspecting Combustion Sections	14
Types of Damage in Turbine Sections	16
Sulfidation	17
Stress Rupture Cracks	18
Stator Vane Bowing	19
Cleaning Engine Internal Components	20
Water Washing	21
Types of Borescopes	22
Using Borescopes	27
Borescope Views	29
Nondestructive Inspections	30

In This Assignment (Continued)

Subject	Page
Visual Inspections	31
Dye Penetrant Inspections	34
How to Conduct Dye Penetrant Inspections	35
Magnetic Particle Inspections	36
How to Conduct Magnetic Particle Inspections	37
Eddy Current Inspections	38
How to Conduct Eddy Current Inspections	39
Ultrasonic Inspections	40
Inspecting Engine Internal Components Self-Quiz	43
Inspecting Engine Internal Components Self-Quiz Feedback	46
Syllabus	49

Anytime an engine is disassembled, for any reason, it should be inspected for serviceability and repaired as required. For inspection procedures, repair procedures, and serviceability limits on your engine refer to the applicable maintenance manual or ACMS card.

Guidelines

When disassembling an engine, the following guidelines should be observed:

- Examine all parts and assemblies for cracks, scoring, and burning (some types of damage are more obvious before parts are cleaned).
- Place all parts on a parts rack to prevent damage.
- Provide proper covering and supports to protect shafts, gears, studs, or any projecting piece from being bent, scratched, or otherwise damaged.
- Use temporary covers to seal all openings in dismantled engines to prevent dirt and other foreign materials from entering the engine.
- Plug or cover the ends of all removed/disconnected tubing/lines.
- Mark parts as necessary for identification to aid in re-assembly, or to highlight damage.

Purpose

Parts may be temporarily marked during disassembly for identification, reference points to aid in re-assembly, or to highlight damage. These marks ensure parts are returned to their original assembly position and to locate defects.

Maintaining Part Identification

If a part is going to be cleaned, inspected, and repaired, temporary markings will probably be removed by solvents during cleaning. If part identification needs to be maintained, attach tags or place parts in separate containers.

Marking Guidelines

When marking parts, adhere to the following guidelines:

- Use only the engine manufacturer's approved marking materials and methods IAW the engine maintenance manual.
- Do not use any temporary marking method that leaves a heavy carbon deposit, or deposits of copper, zinc, lead, or similar residue, i.e. pencil/grease pencil.
- Do not use wire to attach tags to parts (use string).

Marking Materials

Only certain materials must be used for marking parts during disassembly or assembly. Use only DyKem, Marks-A-Lot, or other approved pure dye markers to mark engine hardware. You may use layout dye (lightly applied) to mark parts that are directly exposed to the engine gas path (turbine blades and disks, turbine vanes, and combustion chamber liners).

Effects of Using Unauthorized Marking Materials

Using unauthorized marking materials can leave harmful deposits on engine parts. These deposits may cause carbonization or intergranular attack when the part gets hot. Parts marked with unauthorized materials should have all traces of markings removed before using them.

Because of high rpm, main engine bearings are critical parts of an engine. With the engine disassembled, all bearings and housings can be inspected and replaced as necessary.

Guidelines for Inspecting/ Handling Bearings

While inspecting/handling bearings follow these guidelines:

- Handle new and used bearings with care at all times (used bearings may be reused).
- Do not handle bearings with bare hands (the oils in your skin can promote corrosion).
- Use clean, non-absorbent gloves or special devices to handle bearings.
- Do not handle bearings with perspiration-soaked cotton gloves.
- Clean cotton gloves may be used to handle bearings as a last resort.

Detecting Damage

The need for mechanical measurement of a bearing is seldom necessary because excessive bearing wear or damage can usually be detected by the following:

- Visual inspection
- · Hand-feel test

Inspecting for Damage

Using a magnifying glass as an aid (if necessary), visually inspect the bearing and all contact surfaces for the following types of damage:

- Missing components
- Cracked or bent retainers
- Broken or damaged races
- Dents
- Nicks
- Pits
- Scratches
- Scoring
- Galling
- Brinelling
- Corrosion
- Grooves on rolling elements
- Heat damage
- Excessive wear

Inspection References

For detailed descriptions of the various types of damage refer to the General Instructions, Jet Engine Anti-Friction Bearings manual, AFTO 44B-1-15. Also refer to the maintenance manual for your engine to determine if the damage is within limits.

Hand-Feel Test

Excessive bearing wear can usually be detected by a roughness of metal on the active (contact) surfaces. To perform the hand-feel test, hold one race stationary while rotating the other. If appreciable damage has occurred on the active surfaces, the bearing will feel rough and be noisy. If it fails the hand-feel test, reject the bearing.

Aircraft engine carbon seals are made of precision-machined carbongraphite which is very brittle. Special care shall be exercised at all times when handling or working on carbon seals. A substantial loss of sealing capacity may result from damage or distortion, or from foreign matter in the seal assembly.

Guidelines for Inspecting/ Handling Carbon Seals

When inspecting/handling carbon seals, observe the following guidelines:

- Do not use marking compound or tape on seal parts at any time, since any resulting residue will affect operation of the seal.
- Do not place used carbon segments in styrofoam because the solvents used in cleaning will cause segments to stick to packing.
- Do not attempt to repair carbon surfaces of seal (except to restore flatness).
- Do not touch any part of sealing surfaces since finger prints can affect flatness of sealing surface.
- Do not allow lubricating oil to contaminate sealing surface of seal or its mating ring.
- Clean only with approved solvents.
- After cleaning, place carbon seals in plastic bags or a suitable protective wrapping paper.

Inspecting for Damage

Inspect carbon seals for the following types of damage:

- Sealing surface wear
- Pits
- Scratches
- Nicks
- Chipping
- Cracks

Damage Terminology

To describe the damage found during engine inspections you must know the proper terms to use. The following table is a partial list of terms, a description of what it looks like, and the probable cause.

Term	Appearance	Usual Causes	
Bow	Bent blade	Foreign objects or excessive heat	
Burning	Injury to surfaces evidenced by discoloration or, in severe cases, by flow of material.	Excessive heat	
Burr	A ragged or turned-out edge	Grinding or cutting operation	
Corrosion (pits)	Breakdown of the surface; pitted appearance	Corrosive agents; moisture, etc.	
Cracks	A partial fracture (separation)	Excessive stress due to shock, overloading, or faulty processing; defective material; overheating	
Deformation	Waviness along the leading edge	Excessive heat	
Dent	Small, smoothly rounded hollow	Striking of a part with a dull object	
Erosion	Material worn away	Normal wear and/or small particles passing through engine	
Galling	Transferring of metal from one surface to another	Severe rubbing	
Gouging	Displacement of material from a surface; a cutting or tearing effect	Presence of a comparatively large foreign body between moving parts	
Growth	Elongation of blade	Continued and/or excessive heat and centrifugal force	
Material Fallout	Missing material	Converging cracks, excessive heat, and Foreign Object Damage (FOD)	

Damage Terminology (Continued) This is a continuation of the Damage Terminology table from the previous page.

Term	Appearance	Usual Causes	
Pit	(See Corrosion)		
Score	Deep scratches	Presence of chips between surfaces	
Scratch	Narrow, shallow marks	Sand or fine foreign particles; careless handling	
Tip Rollover	End of rotor blades curled over	Excessive tip rub	
Tip Rub	Scored casing in tip path plane	Shock or blade growth	
Warpage	Unnatural contours	Excessive heat	

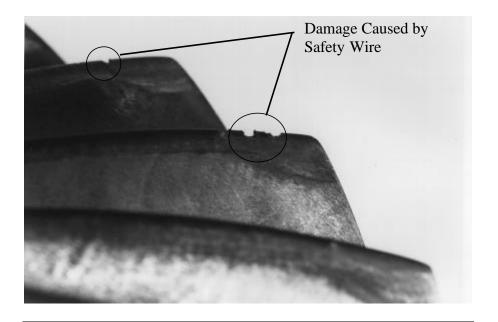
The compressor section can be inspected with a borescope or during engine tear down. It may be a scheduled inspection or due to a problem with engine performance.

Foreign Object Damage (FOD)

Loose objects often enter an engine's compressor either accidentally or through carelessness. Thousands of dollars in damage can result from these objects passing through the engine.

Example of FOD

The illustration below shows the damage caused by a piece of safety wire passing through a LTS-101-750B-2 compressor.

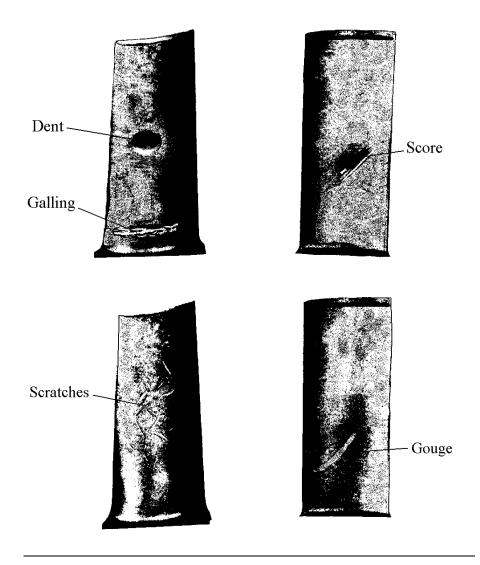


Inspection

When inspecting the compressor section, you should look for the types of damage shown in the Examples of Compressor Blade Damage below. You should also look for broken blades and evidence of FOD. Refer to the appropriate maintenance publication for your engine for the types of damage to look for and the limitations.

Examples of Compressor Blade Damage

The following are examples of damage to look for on compressor blades.



Depending on the engine, the combustion section can be removed, repaired, or replaced in part or entirely depending on the extent of damage encountered. Most repairs to this section are accomplished by welding or replacing components.

Inspecting for Damage

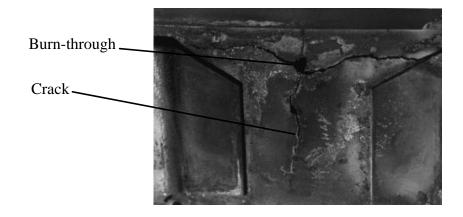
Inspect the combustion liner for the following types of damage:

- Cracks
- Overheating/hot spots (metal discoloration)
- Fretting (metal wear where the combustion liner contacts other metals, i.e. fuel nozzle port)
- Burn-through (hole in liner)
- Broken spot welds

This list is not all inclusive. For specific inspection criteria for your engine, refer to the applicable maintenance publications.

Example of Combustion Section Damage

This illustration shows cracks and burn-through on an ATF3-6 combustion liner.



General Guidelines

When inspecting combustion sections use the following general guidelines:

- Use the dye penetrant NDI method to enhance the visual inspection.
- Cracks converging so that metal could break loose is cause for rejecting a liner.
- Combustion chamber components may be retained in service with some flaws.

For specific damage limitations on your engine refer to the applicable maintenance manual and replace or repair components as required.

Damage in the turbine section is usually found during a scheduled borescope inspection. Turbine sections are exposed to extreme heat, therefore all the components should be thoroughly inspected. Once the damage has been determined to be out of limits, the engine is either replaced or disassembled for further inspection, repair, or replacement of defective components.

Inspecting for Damage

Whether you are performing a borescope inspection or the engine has been disassembled, you should inspect for the following types of damage:

- Turbine rotor and blades:
 - Cracks
 - Sulfidation
 - Stress rupture cracks
 - Deformation (waviness) of the leading edge
 - Nicks and dents
 - Burning
 - Tip rub
 - Erosion
- Nozzle vanes:
 - Nicks
 - Burrs
 - Dents
 - Pits
 - Distortion
 - Cracks
 - Burned areas

Interpreting Damage

Stress rupture cracks or deformation of the leading edge are often mistaken for foreign object damage (FOD). When these conditions are found, suspect an over temperature condition and investigate the possible cause.

Sulfidation 5.D.04

Introduction

Sulfidation is high-temperature corrosion that starts with excessive levels of sodium and sulfur in the air and fuel mixture entering the engine. This type of environment causes sulfidation to attack turbine blades and stator vanes, which disrupts airflow.

Description of Sulfidation

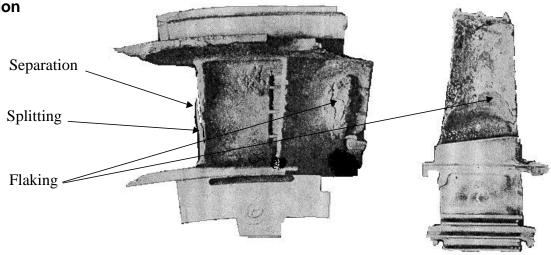
Sulfidation first appears as a rough or crusty surface on the leading edge and concave surface of the airfoil. It progresses to scaling, splitting, delamination, and eventual metal loss.

Acceptable/ Unacceptable Sulfidation

This form of corrosion is permissible in the rough or crusty stage. All blades should be inspected for sulfidation and the component should be replaced if in any area of the blade there is evidence of any of the following types of damage:

- Splitting
- Delamination
- Separation
- Flaking
- Loss of material

Example of Unacceptable Sulfidation This illustration shows some examples of unacceptable sulfidation.

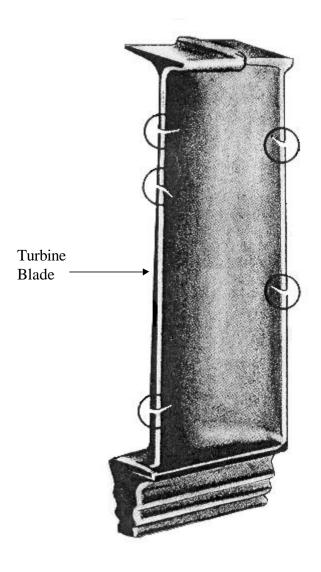


Description

Stress rupture cracks usually appear as fine hairline cracks. These cracks are found on or across the leading or trailing edge at a right angle to the edge length of the blade. Visible cracks may range in length from 1/16 inch upward.

Example of Stress Rupture Cracks

The circled areas in this illustration shows what stress rupture cracks look like.



Description

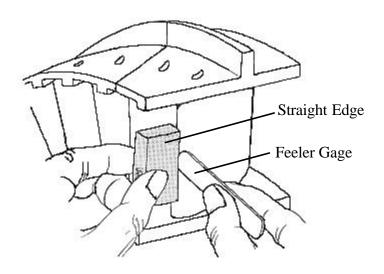
Stator vane bowing is a vane that is curved, and it is usually caused by high heat.

Checking Vane for Bowing

Visually inspect stator vanes for signs of bowing. If bowing is suspected, use a straight edge and feeler gage to measure the amount of bowing. Compare your findings to the limitations listed in the maintenance manual for your engine and replace as required.

Illustration of Checking Vane for Bowing

This illustration shows a technician checking a vane for bowing with a straight edge and feeler gage.



Purpose

The primary purpose for cleaning gas turbine engine parts is to remove the contaminants that might conceal minor cracks and defects which, if not detected, could eventually lead to failure. All parts must be sufficiently cleaned so a thorough inspection can be performed.

Definition of Clean

Clean means that the part is free of rust, flaky scale, grease, paint, oily films, and dirt.

Avoid Over Cleaning

Gas turbine engine components will be cleaned only as necessary to perform adequate inspection and repairs. In some cases, over cleaning can be more detrimental than beneficial to an engine. Bright surfaces are obtained only with vigorous methods which sacrifice some base metal. Repeated use of these methods, followed by oxidation and scale buildup during use, can be detrimental to the dimensional stability of the components. Therefore, over cleaning should be avoided.

Cleaning Processes and Agents

There is no single cleaning agent or process that will clean all of the parts. Different cleaning agents are necessary for different metals. The selection of a cleaning agent will have to be made based on the metal to be cleaned and the cleaning method you will use. When selecting a cleaning agent, the following questions must be answered:

Will the cleaning agent...

- attack the metal chemically?
- leave a residue?
- cause the metal to corrode?

To answer these questions and for detailed descriptions of cleaning agents, cleaning processes and the metals they can be used on, refer to the Cleaning of Gas Turbine Aircraft Engines and Parts manual, AFTO 2J-1-13.

Definition

Water washing is the process of injecting an emulsion of water and cleaning liquids into the engine inlet while the engine is being motored.

Purpose for Water Washing

Water washing is accomplished for the following reasons:

- Primarily as a desalination wash to remove salt deposits after an aircraft has been operated in salt-laden air.
- When engine performance has degraded significantly, water washing may remove enough dirt, sulfidation, and other deposits to recover the lost engine performance.
- Although water washing is not required before borescoping, it is
 often recommended because it helps clean the engine so you get
 the best possible evaluation. Dirt and carbon particles may
 obscure small cracks or pitting that could be missed in a dirty
 engine.

General Procedures

Specific steps to follow in cleaning a particular engine are found in the maintenance instructions for that engine. However, the table below lists the basic steps for water washing any engine.

Step	Action		
1	Block appropriate lines and ports.		
2	Remove appropriate equipment from the inlet duct to prevent damage by cleaning material.		
3	Motor the engine for a specified time period while the cleaning compound is fed into the inlet duct.		
4	Motor the engine for a specified time period while clean water is fed into the inlet duct to rinse the engine.		
5	Return the engine to its original configuration by restoring whatever was disconnected or removed in steps 1 and 2.		
6	Dry the engine by running it for a specified time period.		

Purpose

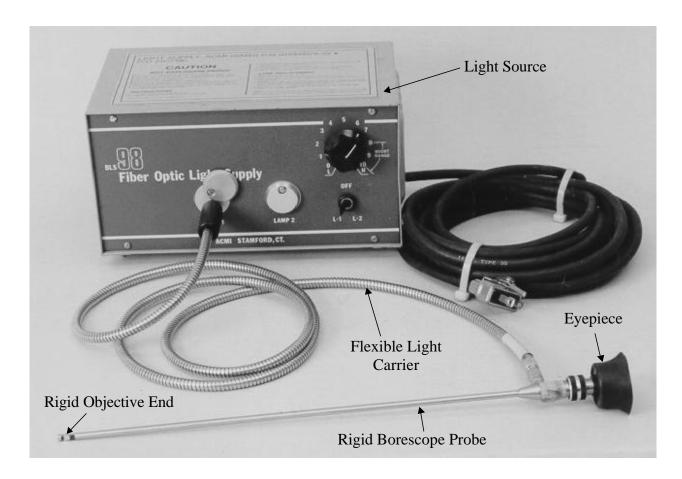
Borescopes provide illumination and a way to visually inspect internal areas of aircraft engines and engine parts. Using a borescope allows for internal inspections that require minimum disassembly, such as the removal of port covers, ignitors, or thermocouples.

Description of a Rigid Borescope

The rigid borescope assembly has a straight, non-flexible shaft which only allows for inspection of internal engine conditions in areas that have direct access.

Illustration of a Rigid Borescope

This illustration shows the components and accessories of a typical rigid borescope.



Part/Function Table

The following table lists the parts and functions of the rigid borescope.

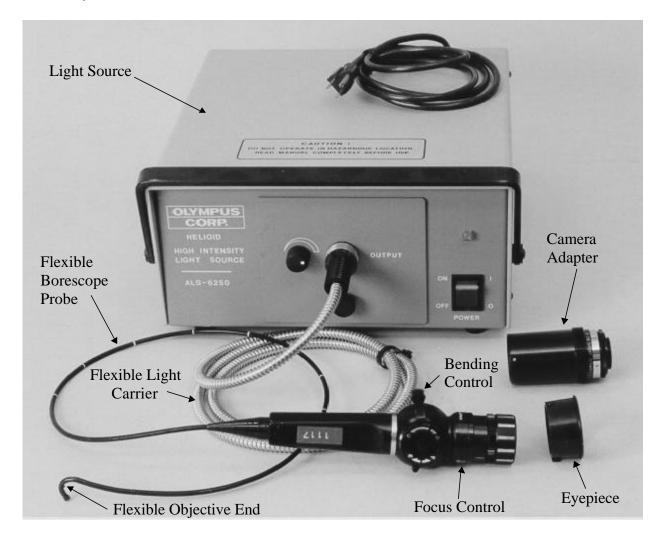
Part	Function		
Light Source	Provides high-intensity light for viewing		
Flexible Light Carrier	Transmits light from source to borescope		
Rigid Borescope Probe	Transmits light from borescope to objective end and provides access to internal engine components which can be directly accessed		
Rigid Objective End	Illuminates and views internal areas of the engine		
Eyepiece	Keeps surrounding light from interfering with the view		

Fiber-Optic Borescope

This type of borescope has a flexible probe and is also called a fiberscope. The flexible probe can be snaked around, behind, and into areas impossible to reach with a rigid scope.

Illustration of Fiber-Optic Borescope

This illustration shows the components of a fiber-optic borescope.



Part/Function Table

The following table lists the parts and functions of the fiber-optic borescope.

Part	Function		
Light Source	Provides high-intensity light for viewing		
Flexible Light Carrier	Transmits light from source to borescope		
Flexible Borescope Probe	Transmits light from borescope to objective end and provides access to internal engine components		
Flexible Objective End	Illuminates and views internal areas of engine		
Bending Control	Used to position (bend) objective end		
Focus Control	Used to focus the view		
Eyepiece	Keeps the surrounding light from interfering with the view		
Camera Adapter	Allows for the attachment of a camera to record engine conditions		

Advantages of Fiber-Optic Borescope

The fiber-optic borescope has the following advantages over the rigid borescope:

- Inspect areas without opening the engine
- Can be worked back through the compressor from the front of the engine.
- Can be inserted through a fuel nozzle opening and worked back to the turbine area.
- Can be worked up close to the surface being inspected.

The ability to access possible damage at very close range is a distinct advantage over the rigid type borescope. A fiber-optic borescope and an inspector experienced in its use could make the difference between the man-hours spent rejecting a perfectly good engine or obtaining more flight hours from that same engine after suspected damage was found not to exist.

Before using a borescope, familiarize yourself with its features and learn how to use them. Borescopes are easily damaged, and they have different characteristics.

Example of Different Characteristics

Optical characteristics of a small borescope magnify and distort all areas other than the turbine blade leading edge. This is often misinterpreted by the technician to be extensive damage.

Locating **Inspection Ports**

For the location of inspection ports on your engine and what can be inspected from that port, refer to the applicable maintenance publication.

Guidelines for Using Borescopes

Follow these guidelines when using a borescope on an aircraft engine:

- Establish internal reference points.
 - Pictorial and cut-away diagrams help establish reference points.
 - Some borescopes have an index mark on the eyepiece to show the direction in which the objective end is facing. When the probe is in the inspection port, it is easy to lose your sense of direction.
- Scan the inspection area thoroughly and in an orderly manner.
 - Damage to the compressor and turbine blades can be difficult to detect because of small close parts
 - Rotate the engine slowly
 - Ensure the borescope optics are not deteriorated
 - Maintenance publications will list the types of damage to look for in a particular area.
- Inspect all areas for the following types of damage:

Cracks Bends

Scratches - Carbon Buildup - Carbon Streaks

Grooves

Rub Marks Corrosion

Nicks Dents Galling **Erosion**

Discoloration **Tears**

Guidelines for Using Borescopes (Continued)

Measure cracks

- Mark or bend an 18-inch length of lockwire and insert the wire through an adjacent inspection port
- This wire can be used as a gage to measure vane cracks while viewing through the borescope

CAUTION

Ensure that the borescope probe is not damaged when rotating the engine. On turbofan engines, you should not borescope if there is a possibility that wind can rotate the fan rotor.

• Inspect rotating parts

- Rotate the engine (by hand only) to inspect the rotating components
- Refer to the applicable maintenance publication for the proper method to rotate the engine

Record findings

- Record all damage information including stage, area, magnitude, direction, and adjacent material conditions
- Some borescopes are capable of being connected to a video camera to record engine conditions

• Determine Serviceability

- Compare your findings with serviceability limits in the applicable maintenance publication for your particular engine
- Report your conclusions and recommendations to your supervisor

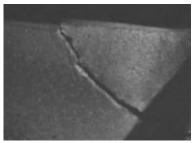
• Follow Procedures

- Carefully read and follow the procedures in your engine maintenance manuals for borescoping
- Different procedures are required for different types of engines to prevent damage or to properly inspect

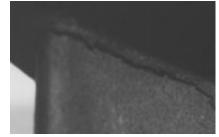
Viewing internal engine components through a borescope can be deceiving. It takes time and practice to learn to use a borescope properly and to interpret what you are viewing. Positioning the viewing probe is the most important factor in performing a proper borescope.

Examples of Borescope Views

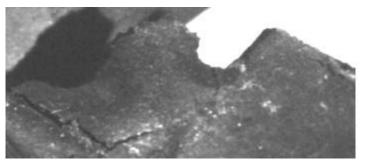
The illustrations below show typical borescope views of damage in various engines.



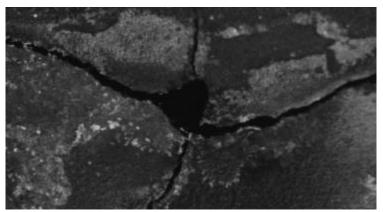
Cracked LTS-101 Stator Vane



Cracked T56-A-15 Stator Vane



Cracked and Burned LTS-101 Gas Producer Wheel Rotor Blade



Cracked and Burned ATF3-6 Combustion Liner

Nondestructive inspection (NDI) methods are utilized to inspect engine components when there is suspected damage or if the procedure is required. The material in this section is basic, but it will enable you to identify the different NDI methods by identifying the distinct characteristics of them.

Definition of NDI

Nondestructive inspections employ various methods to check the soundness of a material or part without impairing or destroying the serviceability of the part.

Qualified NDI Personnel

Knowing how to identify the different types of NDI's does not qualify you to perform these inspections. Some NDI's are fairly simple and can be learned on-the-job by working with others while using job aids, such as ACMS MPC's. Other detailed and in-depth inspections may have a certification requirement.

NOTE

Ask your supervisor for guidance if you are directed to perform a task you are not thoroughly familiar with.

Attending Advanced NDI Training

Advanced training is available for nondestructive inspections. See the Leading Chief Petty Officer at your unit for more information if you are interested in attending this training.

Visual inspection is the oldest NDI method. Though not generally referred to as a NDI method, it is performed without damaging the part to be inspected.

Application of Visual Inspections

All you need to perform a visual inspection is eyesight and sufficient light. This is obvious, but how you view what you are inspecting can be the difference between finding, or not finding, a discrepancy.

Viewing Perspectives

When performing a visual inspection, there are different viewing perspectives used. Combining these views can alter your perception of parts in relationship to each other. Listed below are the common views used to perform visual inspections:

- front
- side (left and right)
- top
- bottom

Tunnel Vision and Big Picture

Tunnel vision and *big picture* are unofficial terms not found in publications you use on the job, as related to aircraft. These terms are mentioned here because you will hear them used, and they are significant to your viewing perspective when performing visual inspections.

NOTE

The term tunnel vision is commonly spoken in a negative manner, but in reality, it is inherently used during visual inspections. It is when tunnel vision and big-picture viewing perspectives are used together that a more thorough visual inspection can be performed.

Description of Tunnel Vision and Big Picture

Listed below are descriptions of tunnel vision and big picture:

- **Tunnel vision** is viewing (focusing) on one part at a time. It provides for a concentrated viewing of a part. This type of viewing does not take into account the relationship of the surrounding area or other parts, to the part being viewed.
- **Big picture** viewing takes into account the relationship of a part being viewed with the surrounding area and other parts.

Example of Combining Tunnel Vision and Big Picture

Sometimes there may be only a singular part to be viewed, for example, a fuel control assembly in an engine shop. When this same fuel control assembly is mounted on an engine that is installed on an aircraft, you would visually inspect the fuel control *and* view it in relation to the surrounding area and other parts.

Equipment Used to Enhance Visual Inspections

Defects which would escape the naked eye can be magnified so they will be visible. The following types of equipment employ magnification to enhance visual inspections:

- Magnifying glasses
- Borescopes

Common Discrepancy Table

When performing visual inspections, you can make use of your other senses to confirm something your eyes suspect. The following table lists common discrepancies you may identify by the human range of senses. It is not all inclusive and does not list the sense of taste.

Sight	Touch	Hearing	Smell
Leaks	Leaks	Leaks	Leaks
Obstructions	Obstructions	Obstructions	Burning
Burning	Heat/cold	Loose hardware	Lack of cleanliness
Corrosion	Corrosion	Delamination	
Loose hardware	Loose hardware	Chafing	
Discoloration	Delamination		
Misalignment	Lack of cleanliness		
Dents, punctures, cracks, cuts, etc	Dents, punctures, cracks, cuts, etc.		
Delamination			
Improper pressure/fluid levels			
Lack of cleanliness			
Chafing			

Example of Integrating Visual Inspections with Other Inspections

Use of the visual inspection method is integral to all other types of inspections.

<u>Example</u>: the final evaluation of results for a Dye Penetrant NDI are inspected visually.

Introduction

Dye Penetrant NDI is a simple, inexpensive, and reliable method used for detecting defects which are open to the surface of the part to be inspected. This method can be used on metals and other nonporous materials that are not damaged by penetrant materials.

Component Table

The components used to perform a dye penetrant inspection is listed in the table below.

Component	Purpose
Cleaner	Used to clean the surface to be inspected
Penetrant	Permeates defects in the metal
Developer	Aids in drawing any trapped penetrant from defects and improves the visibility of defects
Ultra-violet Light	Reflects off the penetrant to highlight defects

Inspection Kit Components

The following illustration shows the components of a Dye Penentrant NDI kit.



Ultra-violet Light

Developer, Penetrant, & Cleaner Aerosol Cans

Dye Penetrant Inspection Steps

The following table lists the steps of a Dye-Penetrant NDI.

NOTE

The apparent simplicity of the penetrant inspection is deceptive. Very slight variations in performing the inspection process can invalidate the inspection by failing to indicate serious flaws.

Step	Action	Illustration
1	Clean the test area with the required cleaner.	
2	Apply the penetrant solution to the test area. The penetrant is allowed to remain on the part for a period of time (dwell time) to permit it to enter and fill any opening or defect.	
3	Wipe off excess penetrant. The excess penetrant is then removed.	
4	Apply the developer to the test area. The developer aids in drawing any trapped penetrant from defects and improves the visibility of indications by providing contrast.	
5	Evaluate the test results using a blacklight.	

Introduction

Magnetic particle inspection is a NDI method used for detecting discontinuities on or near the surface in materials that can be magnetized.

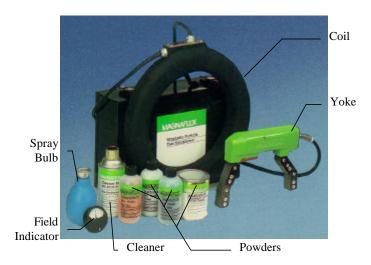
Component Table

The components used to perform a magnetic particle inspection is listed in the table below.

Component	Purpose
Cleaner	Cleaning the test area.
Magnetic particles (powder)	Applied to magnetized part to detect defects.
Spray bulb	Applies the magnetic powder.
Yoke	Continuously applies a magnetic field.
Coil	Continuously applies a magnetic field.
Field Indicator	Measures residual magnetism in parts.

Inspection Kit Components

The following illustration shows the components of a Magnetic Particle NDI kit.



Magnetic Particle Inspection Steps

The following table lists the steps of a Magnetic Particle NDI.

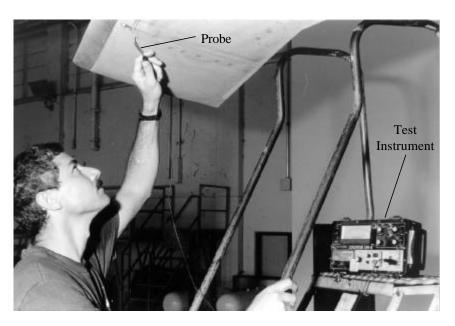
Step	Action	Illustration
1	Clean the test area.	
2	Apply the test equipment (yoke) to the test area for continuous magnetization of the area.	SOKE DOODED
3	Apply magnetic particles to the test area. The particles will adhere to the area containing a defect.	NONE TO SEE
4	Evaluate the test results.	

Introduction

Eddy current inspection is a NDI method used in which eddy current flow is induced in the test area. Eddy currents are electrical and circular in nature. Their paths are oriented perpendicular to the direction of an applied magnetic field.

Inspection Illustration

The following illustration shows an Eddy Current NDI application.



Parts and Functions

This table lists the parts and functions of the eddy current NDI test instrument.

Part	Function
Probe	Introduces a varying magnetic field into a part
	Determines the effects of test variables on this magnetic field
	Sends signals back to the test instrument.
Test Instrument	Generates an alternating current to the test coil
	Receives feedback signals from the probe
	Displays signals through visual or audible instrumentation

Eddy Current Inspection Steps

The following table lists the steps of an Eddy Current NDI.

Step	Action
1	Clean the test area with appropriate cleaning materials.
2	Calibrate the test instrument to the surface material as per instructions (normally ACMS MPC's).
3	Inspect the test area as per instructions.
4	Evaluate the test results.

Introduction

Ultrasonic inspection is an NDI method that uses sound waves. The term "ultrasonic" means vibrations (sound waves) whose frequencies are greater than those that affect the human ear.

Types of Ultrasonic Inspections

Ultrasonic NDI can be separated into two basic types:

- Contact
- Immersion

The contact method is the only method currently used in Coast Guard aviation.

Inspection Illustration

The following illustration shows an Ultrasonic NDI application.



Inspection Description

Ultrasonic test units (instruments) may vary in design, but the basic principles of operation for the contact method of inspection are the same.

Phase/ Description Table

The following table lists the phases and descriptions of the Ultrasonic NDI process.

Phase	Description
1	Sound waves (ultrasonic vibrations) are generated by applying high-frequency electrical pulses to a transducer element.
2	The transducer element transforms the electrical energy into sound waves. It is an integral part of the search unit assembly (the search unit is the device placed upon the surface of the test part).
3	Sound waves are transmitted between the search unit and the test part through a coupling medium, such as oil. This coupling medium also removes any air between the transducer and the test part.
4	The sound waves are transmitted into and through the part. When the sound waves strike the far surface of the part or the boundary of a defect, they reflect back through the test part, the coupling medium, and then enter the transducer, where they are converted back into electrical energy.
5	The electrical energy is converted, displayed, and then interpreted on a cathode ray tube (CRT) screen or a metered scale. The results are then evaluated.

5.D.04 Blank Page

Questions

Answer the following questions on Inspecting Engine Internal Components:

_____.

1. Anytime an engine is disassembled it should be _____

2. What should be done to prevent the entrance of dirt and other foreign materials into a dismantled engine?

and assemblies prior to cleaning?

- 3. When disassembling an engine, why should you examine all parts
- 4. When marking parts that are directly exposed to the engine gas path, you may use ______.
- 5. Why should you NOT handle bearings with your bare hands?
- 6. What publication should be referred to for detailed descriptions of different types of damage that may be encountered when inspecting engine bearings?
- 7. The transferring of metal from one surface to another is known as
- 8. When inspecting for cracks, what NDI method would be used to enhance a visual inspection of combustion liners?

5.D.04 Inspecting Engine Internal Components Self-Quiz (Continued)

Questions (Continued)	9. Stress rupture cracks on turbine blades are often mistaken for what type of damage?
	10. Sulfidation is permissible in the or stage. 11. The primary purpose of cleaning gas turbine engine parts is to
	12. A rigid borescope allows for inspection of internal engine conditions in areas that have
	13. To inspect engine internal rotating parts, you should rotate the engine by only.
	14. Nondestructive inspections use various methods to check the soundness of a material or part without
	Continued next page

Questions (Continued)

15. Match the characteristics of nondestructive inspections listed in column B with the NDI methods listed in column A. Use each letter only once.

Column A	Column B
, 1. Visual	a. Uses magnifying glasses
,2. Dye Penetrant	b. Oldest method
,3. Magnetic Particle	c. Uses aerosol cans
4. Eddy Current	d. Uses sound waves
, 5. Ultrasonic	e. Detects on or near surface discontinuities in magnetized materials
	f. Particles adhere to defects
	g. Uses penetrant and developer solutions
	h. A search unit is placed on the surface of test part
	i. Calibrate test unit to surface

5.D.04 Inspecting Engine Internal Components Self-Quiz Feedback

Self-Quiz Feedback

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	inspected for serviceability	5
2.	Use temporary covers to seal all openings	5
3.	Some types of damage are more obvious before parts are cleaned	5
4.	layout dye	6
5.	Oils in your skin can promote corrosion	7
6.	T.O. 44B-1-15	8
7.	galling	10
8.	Dye Penetrant	15
9.	Foreign Object Damage (FOD)	16
10.	rough or crusty	17
11.	remove contaminants that might conceal defects which could lead to failure	20
12.	direct access	22
13.	hand	28
14.	impairing or destroying the serviceability of the part	30

Self-Quiz Feedback (Continued)

This is a continuation of the feedback table on the preceding page.

Answer	Reference
1. a, b 2. c, g 3. e, f 4. i 5. d, h	31, 32 34, 35 36, 37 39 40, 41
	1. a, b 2. c, g 3. e, f 4. i

5.D.04 Blank Page

Syllabus 5.D.04

Performance

INSPECT aircraft engine internal components for service and repair limits.

Performance Objective 1

Given the name of an aircraft internal engine component and necessary equipment, **LOCATE** the component using one or more of the following references:

HH-65A

- 1H-65A-11-72-2B2
- 1H-65A-11-72-11B2
- 1H-65A-11-72-4B2

HH-60J

- A1-H60CA-220-300
- A1-T700A-MMI-200
- A1-T700A-IPB-400

HC-130H

- 2J-T56-44
- 2J-T56-53
- 2J-T56-56
- MPC Index, Chapters 72, 73, 74

HU-25A

- 2J-ATF3-2-1
- 2J-ATF3-2-2
- 2J-ATF3-2-3
- 2J-ATF3-4
- MPC Index, Chapters 72, 73, 74

Performance Objective 2

Given the name of an aircraft internal engine component and necessary equipment, **IDENTIFY** the publication containing the procedures for inspecting the component using one or more of the following references:

HH-65A	
• 1H-65A-01	
• MPC Index, Chapter 72	
НН-60Ј	
• A1-H60CA-AML-000	
• MPC Index, Chapter 72	
НС-130Н	
• CGTO 1C-130H-01	
• 1C-130H-2-00JG-00-1	
• MPC Index, Chapters 72, 73, 74	
HU-25A	
• CGTO 00-25-01	
• MPC Index, Chapters 72, 73, 74	

Performance Objective 3

Given the name of an aircraft internal engine component and necessary equipment, **INSPECT** the component using the procedures in one or more of the following references:

HH-65A

- AFTO 33B-1-1
- 1H-65A-11-72-2B2

HH-60J

- MPC Index, Chapter 72
- AFTO 33B-1-1
- A1-H60CA-220-300
- A1-T700A-MMI-200
- A1-T700A-MMI-210

HC-130H

- AFTO 33B-1-1
- 2J-T56-53
- 2J-T56-56
- MPC Index, Chapters 72, 73, 74

HU-25A

- AFTO 33B-1-1
- 2J-ATF3-2-1
- 2J-ATF3-2-2
- 2J-ATF3-2-3
- MPC Index, Chapters 72, 73, 74

Performance Objective 4

Given the name of an aircraft internal engine component and necessary equipment, **IDENTIFY** the inspection standards and wear/repair limits IAW one or more of the following references:

HH-65A

- MPC Index, Chapter 72
- 1H-65A-11-72-2B2
- 1H-65A-11-72-11B2

HH-60J

- MPC Index, Chapter 72
- A1-H60CA-220-300
- A1-T700A-MMI-200
- A1-T700A-MMI-210

HC-130H

- 2J-T56-53
- 2J-T56-56
- MPC Index, Chapters 72, 73, 74

HU-25A

- 2J-ATF3-2-1
- 2J-ATF3-2-2
- 2J-ATF3-2-3
- MPC Index, Chapters 72, 73, 74

	The technical librarian should issue an it report to each shop every nths.	4. In what manual are the directives for the involvement in the JOAP located?
		A. M3710 1 (series)
	A. two	B. M13020.1 (series)
	B. three	C. NAVAIR 1-1-2
	C. four	
		D. NAVAIR 17-15-50 (series)
	D. six	
		5. When taking a JOAP sample, use only
2.	The shop technical publications audit	rags that are clean and
sho	uld be completed within working	<u> </u>
day	1	A. made of cotton
		B. made of cloth
	A. 5	C. lint free
	B. 10	D. waterproof
		D. waterproof
	C. 15	
	D. 20	
		6. When taking a JOAP sample, you can use the sampling tubes/syringes for
3.	Which form would be used to request	sampling
a co	prrection to the	1 0 ====
CGTO 1H-65A-1 flight manual?		A. twice, if used with the same color
		of oil
	A. AFTO Form 103	B. only once

- A. AFTO Form 103
- B. CG-22
- C. CG-4377
- D. AF Form 847

C. twice, if the tube/syringe has been

D. as many times as needed to cut

flushed with degreaser

down on cost

- 7. Specific inspection requirements for each aircraft type can be found in which of the following Commandant Instructions?
 - A. M3710.1 (series)
 - B. M3710.2 (series)
 - C. M13020.1 (series)
 - D. M130550.1 (series)
- 8. Which of the following inspections is categorized as a routine inspection?
 - A. Hourly/Weekly
 - B. TCTO
 - C. Bird Strike
 - D. Hard Landing
- 9. Special inspections are maintenance checks that
 - A. are accomplished on a regular or scheduled basis and appear on the Maintenance Due List
 - B. are conditional upon operational environment, specific incidents, or other circumstances requiring inspections
 - C. provide servicing and verification of satisfactory functioning of critical systems at frequent intervals
 - D. determine if the aircraft is suitable for continued flight at the end of each flight and are tracked through ACMS

- 10. If a maintenance procedure requires a follow-up special inspection, it is scheduled on which form?
 - A. CG-4377, Part II
 - B. CG-4377B
 - C. CG-4377A
 - D. CG-5181
- 11. Applicability of a TCTO is determined by _____.
 - A. Commandant (G-SEA)
 - B. Engineering officer at each unit
 - C. Aircraft type Prime Unit
 - D. Aircraft Standardization Team
- 12. To track compliance, a TCTO will appear on which ACMS report?
 - A. How Gozit Report
 - B. Maintenance Due List (MDL)
 - C. Configuration Report
 - D. Maintenance Requirements List (MRL)
- 13. Which feature of an Air Force Interim TCTO serves as direction for compliance?
 - A. Solid black border
 - B. Black and white diagonal border
 - C. Double heading
 - D. Heading in red ink

- 14. Select the group below that has the correct sequence of general troubleshooting steps.
 - A. 1. Perform an operational check
 - 2. Isolate and Locate the malfunction
 - 3. Conduct a visual inspection
 - 4. Classify the malfunction
 - 5. Correct the malfunction
 - 6. Conduct a final operational check
 - B. 1. Classify the malfunction
 - 2. Conduct a visual inspection
 - 3. Isolate and Locate the malfunction
 - 4. Correct the malfunction
 - 5. Perform an operational check
 - 6. Conduct a final operational check
 - C. 1. Conduct a visual inspection
 - 2. Perform an operational check
 - 3. Classify the malfunction
 - 4. Isolate and Locate the malfunction
 - 5. Correct the malfunction
 - 6. Conduct a final operational check
 - D. 1. Isolate and Locate the malfunction
 - 2. Conduct a visual inspection
 - 3. Perform an operational check
 - 4. Classify the malfunction
 - 5. Correct the malfunction
 - 6. Conduct a final operational check

15. Using the troubleshooting scenario below, select from the list of general troubleshooting steps the next step that should be performed.

You are the technician working on a hydraulic pressure fluctuation discrepancy; you notice that the fluid in the hydraulic reservoir is below the "minimum" level. You service the hydraulic reservoir to the correct level. There are no apparent leaks in the system and there are no other visible conditions that could affect the system.

In reference to the general troubleshooting guidelines, what should be your next step?

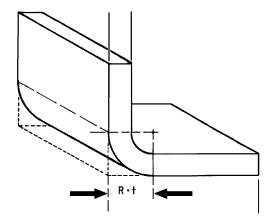
- A. Perform an operational check
- B. Isolate and locate the malfunction
- C. Classify the malfunction
- D. Conduct a visual inspection
- 16. Select the general troubleshooting step that involves this general troubleshooting guideline characteristic: "verifying the suspect component".
 - A. Isolate and locate the malfunction
 - B. Classify the malfunction
 - C. Perform an operational check
 - D. Conduct a visual check

- 17. What is the form called that must be installed on the aircraft cockpit controls before rigging/range checks are performed?
 - A. Flight Safety Maintenance Document
 - B. Unsatisfactory Tag
 - C. Serviceable Tag
 - D. Maintenance Flight Safety Warning Tag
- 18. When an aircraft has been rigged and adjusted, where do you annotate the new rigging calculations?
 - A. Aircraft Inventory Record
 - B. Airframe and Engine Operating Information
 - C. ACMS Configuration Report
 - D. ACMS Significant Component History Report
- 19. What is the definition of a range check?
 - A. A check to ensure the relative alignment of the flight controls to the aircraft structural stops meet specified clearance checks
 - B. A verification that the flight controls are properly rigged
 - C. Adjusting surface travel, system, cable tension, linkages, and adjustable tops specifications
 - D. A check performed to check the relative alignment and adjustment of an aircraft's main structural components

- 20. What is the definition of a rigging check?
 - A. To check that the flight controls are properly rigged and respond properly to the cockpit controls input
 - B. To check the relative alignment and adjustment of an aircraft's main structural components, flight controls surfaces and flight control system.
 - C. To check the relative alignment of the flight controls to the aircraft structural stops
 - D. To check the relative alignment of the weight on wheels switch with the flight controls
- 21. During the actual servicing of an aircraft's oxygen system, you should follow the guidelines set forth in the _____.
 - A. ACMS MPC's
 - B. AFTO 1-25-172
 - C. NAVAIR 01-25-172
 - D. NATOPS 01-130-1
- 22. After you are finished using a refrigerant manifold and gage set, you should _____.
 - A. flush the hoses and manifold with fresh water.
 - B. purge the hoses and manifold with compressed air.
 - C. cap the lines after removing them from the refrigerant.
 - D. purge the lines with refrigerant to clean out any dirt or moisture.

23. Which compressed gas can cause immediate frostbite if exposed to living tissue?	27. Airframe mechanical seal application procedures require the seal.
	A. normalizing
A. Nitrogen	B. applying
B. Oxygen	C. heating
C. Air	D. installing
D. R-134a	
	28. Which of the following is a basic type
24. Which of the following are methods	of airframe sealant?
used in airframe sealing?	
	A. MIL-S-8802
A. Pressure and brush	B. MIL-S-17833C
B. Preformed and sealant	C. Organic
C. Mechanical seal and sealant	D. Pliable
D. Bulk and preformed	
	29. Distortion and secondary damage are
25. A type of rubber used to manufacture	types of damage that would be found during
airframe mechanical seals is rubber.	a inspection.
A. bulk	
B. pliable	A. visual
C. preformed	B. hardness test
D. silicon	C. nondestructive test
	D. magnetic particle test
26. In which of the following locations are	20 While the street 1 to 1 to 2 to 2 to 2 to 2
airframe mechanical seals used?	30. Which structural damage classification is given to damage which cannot be repaired
A. panels	by any practical means?
B. windows	by any practical means:
C. doors	A. Negligible
D. all the above	B. Repairable by patching
	C. Repairable by insertion
	D. Necessitating replacement

- 31. Which type of structural damage repair restores a limited load-carrying ability to the damaged structure?
 - A. Permanent
 - B. Semi-permanent
 - C. Temporary
 - D. One-time flight
- 32. Maintaining the required external contour at the station where they are located is a characteristic of a _____.
 - A. longeron
 - B. rib
 - C. bulkhead
 - D. stringer
- 33. In the illustration below, Which bend layout term are the arrows identifying?
 - A. Bend tangent line
 - B. Setback
 - C. Base measurement
 - D. Thickness



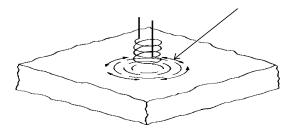
- 34. The radius of a bend plus the thickness of the metal describes the method of determining _____.
 - A. base measurements
 - B. radii
 - C. bend allowance
 - D. setback
- 35. In relation to the metal's grain direction, the possibility for cracks to develop increases when bending metal is at less than _____ degrees.
 - A. 30
 - B. 45
 - C. 70
 - D. 90
- 36. The stress and fatigue caused by vibrations on aircraft and equipment can lead to _____.
 - A. discomfort
 - B. blurred vision
 - C. component failure
 - D. loss of balance
- 37. An imbalanced condition is characterized by a vibration at _____.
 - A. once per revolution
 - B. blade-pass frequencies (2/rev, 3/rev, etc.)
 - C. rotational speed multiplied by number of blades
 - D. twice the rotational speed

42. Which effect on the body is not caused

38. What is used to increase the capability

of components to tolerate misalignment?	by high noise levels?
A. AccelerometerB. Flexible couplingC. Drive shaftD. Shock mount	A. Lack of concentrationB. Shortness of breathC. NauseaD. Raise in blood cholesterol level
39. Repeated daily use of a chemical is best defined as exposure.	43. The noise reduction rating (NRR) for a set of hearing protection is best defined as the
A. acuteB. chronicC. chronographD. dielectric	A. effectiveness of protection offeredB. thickness of protectionC. tensile strength of the protection deviceD. EPA requirement for noise
40. Who is responsible for ensuring that the guidelines of the Respiratory Protection Program are being followed?	abatement
 A. The individual and the individual's supervisor B. Safety officer C. Hazmat officer D. Quality assurance 	44. The current value that is usually fatal as a result of an electrical shock is milliamperes. A. 1 B. 4 C. 14 D. 140
41. When wearing an air-purification respirator you must ensure that it is used in areas where the oxygen concentration is percent.	
A. 7.5 B. 10 C. 14.9 D. 19.5	

- 45. Which body organs are most sensitive to RF radiation?
 - A. Brain and Heart
 - B. Heart and Lungs
 - C. Eyes and Liver
 - D. Eyes and Testicles
- 46. What is the arrow identifying in the below diagram?



- A. Eddy currents
- B. Alternating current (AC)
- C. Coil
- D. Electron vortex

- 47. Which of the following describes the bridge circuit in an eddy current instrument?
 - A. Provides an alternating current or specified frequency range to the test coil
 - B. Serves to introduce a varying magnetic field into the part being inspected
 - C. Converts changes in eddy current magnitude and distribution into signals for subsequent processing and display
 - D. Suppresses unwanted signals from conditions for which inspection is not required
- 48. Which of the following describes a filtering signal processing circuit in an eddy current instrument?
 - A. Provides an alternating current or specified frequency range to the test coil
 - B. Serves to introduce a varying magnetic field into the part being inspected
 - C. Converts changes in eddy current magnitude and distribution into signals for subsequent processing and display
 - D. Suppresses unwanted signals from conditions for which inspection is not required

49. Anytime an engine is disassembled, it	51. The transferring of metal from one
should be	surface to another is known as
A. water washed prior to	A. gouging
disassembling	B. galling
<u> </u>	C. erosion
B. thoroughly cleaned before	
inspecting components	D. material fallout
C. inspected for serviceability	
D. borescoped prior to	
disassembling	52. The dye penetrant method of
	performing a nondestructive inspection uses
	what type of light to improve the visibility
50. When marking parts that are directly	of the penetrant?
exposed to the engine gas path, you may use	or wife personality
exposed to the engine gas path, you may use	A. Neon
·	
	B. Fluorescent
A. layout dye	C. Incandescent
B. pencil	D. Ultra-violet
C. grease pencil	
D. paint	
APPENDIX A. PAMPHLET REVIEW	QUI <i>7</i>

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APPENDIX B, PHAMPHLET REVIEW QUIZ ANSWER KEY

QUESTION	ANSWER	REFERENCE
1.	C	5.A.03c Pg. 4
2.	A	5.A.03c Pg. 10
3.	D	5.A.04c Pg. 13
4.	D	5.A.01 Pg. 3
5.	C	5.A.01 Pg. 7
6.	В	5.A.01 Pg. 7
7.	C	5.B.01c Pg. 3
8.	A	5.B.01c Pg. 4
9.	В	5.B.01c Pg. 10
10.	D	5.B.01c Pg. 14
11.	A	M13020.1 (series) Pg. 5-4
12.	В	M13020.1 (series) Pg. 5-4
13.	C	M13020.1 (series) Pg. 5-4
14.	C	5.B.GTG Pg. 3
15.	A	5.B.GTG Pg. 5
16.	A	5.B.GTG Pg. 8
17.	D	5.B.15 Pg. 10
18.	D	5.B.15 Pg. 10
19.	В	5.B.15 Pg. 3
20.	В	5.B.15 Pg. 3
21.	A	5.B.20 Pg. 6
22.	C	5.B.20 Pg. 13
23.	D	5.B.20 Pg. 14
24.	C	5.B.27 Pg. 3
25.	D	5.B.27 Pg.4
26.	D	5.B.27 Pg. 5
27.	D	5.B.27 Pg. 5
28.	D	5.B.27 Pg. 6

APPENDIX B, PHAMPHLET REVIEW QUIZ ANSWER KEY

QUESTION	ANSWER	REFERENCE
29.	A	5.B.29 Pg. 4
30.	D	5.B.29 Pg. 8
31.	D	5.B.29 Pg. 9
32.	C	5.B.29 Pg. 16
33.	В	5.B.29 Pg. 23
34.	D	5.B.29 Pg. 29
35.	В	5.B.29 Pg. 35
36.	C	5.B.30 Pg. 3
37.	A	5.B.30 Pg. 6
38.	В	5.B.30 Pg. 7
39.	В	5.D.01c Pg. 14
40.	A	5.D.01c Pg. 20
41.	D	5.D.01c Pg. 23
42.	В	5.D.01c Pg. 30
43.	A	5.D.01c Pg. 34
44.	D	5.D.01c Pg. 38
45.	D	5.D.01c Pg. 42
46.	A	5.D.01 Pg. 4
47.	C	5.D.01 Pg. 6
48.	D	5.D.01 Pg. 6
49.	C	5.D.04 Pg. 5
50.	A	5.D.04 Pg. 6
51.	В	5.D.04 Pg. 10
52.	D	5.D.04 Pg. 34

Publication Number	Publication Name
00-25-01	List Of Applicable Publications
1C-130A-23	System Peculiar Corrosion Control
1C-130A-3	Structural Repair Instruction
1C-130E-2-21JG-30-1	Air Conditioning Temperature Control
1C-130E-2-49FI-00-1	GTC Fault Isolation Manual
1C-130E-2-49JG-00-1-1	GTC Job Guide Manual
1C-130E-2-49JG-00-1-2	GTC Job Guide Manual
1C-130H-01	C-130 List Of Applicable Publications
1C-130H-10	Aircraft Power Package
1C-130H-2-00JG-00-1	Job Guide Index
1C-130H-2-12JG-10-2	Airplane Servicing
1C-130H-2-13	Airplane Wiring Diagram
1C-130H-2-2	Ground Handling, Servicing, and Airframe
	Maintenance
1C-130H-2-21FI-00-1-2	Temperature Control
1C-130H-2-21GS-00-1	Air Conditioning System
1C-130H-2-21JG-00-1	General Maintenance
1C-130H-2-21JG-10-1	Air Conditioning-Bleed Air
1C-130H-2-21JG-20-1	Air Conditioning-Distribution
1C-130H-2-21JG-30-1	Air Conditioning-Pressurization
1C-130H-2-21JG-40-1	Air Conditioning-Under Floor Heat
1C-130H-2-21JG-50-1	Airflow (AF 74-01658 and Up)
1C-130H-2-21JG-50-2	Airflow (Prior to AF74-01658)
1C-130H-2-21JG-60-1	Air Conditioning-Temperature Control
1C-130H-2-26FI-00-1	Fire Protection System
1C-130H-2-26JG-10-1	Fire Detection System
1C-130H-2-26JG-20-1	Fire Protection System
1C-130H-2-27FI (series)	Aileron Controls Fault Isolation

Publication Number	Publication Name
1C-130H-2-27GS (series)	Aileron Control General Systems
1C-130H-2-27JG (series)	Aileron Controls Job Guide
1C-130H-2-28FI (series)	Fuel System Fault Isolation
1C-130H-2-28GS (series)	Fuel System General Systems
1C-130H-2-28JG (series)	Fuel System Job Guide
1C-130H-2-29FI-00-1	Hydraulic Fault Isolation Manual
1C-130H-2-29GS-00-1	Hydraulic General Servicing
1C-130H-2-29JG-00-1-1	Hydraulic Job Guide Manual
1C-130H-2-29JG-00-1-2	Hydraulic Job Guide Manual
1C-130H-2-30FI-00-1-1	Ice and Rain Protection
1C-130H-2-30FI-00-1-2	Ice and Rain Protection
1C-130H-2-30JG-00-1	Ice and Rain Protection
1C-130H-2-32FI (series)	Main Landing Gear Fault Isolation
1C-130H-2-32GS (series)	Main Landing Gear General Systems
1C-130H-2-32JG (series)	Main Landing Gear Job Guides
1C-130H-2-35FI-00-1	Oxygen System
1C-130H-2-35GS-00-1	Oxygen System
1C-130H-2-35JG-00-1	Oxygen System
1C-130H-2-49-00-1-2	APU Job Guide Manual
1C-130H-2-49FI-00-1	APU Fault Isolation Manual
1C-130H-2-49GS-00-1	APU General Servicing
1C-130H-2-49JG-00-1-1	APU Job Guide Manual
1C-130H-2-56JG-00-1	Windows
1C-130H-2-61JG-10-1	Job Guide/Organizational Maint./Propeller
1C-130H-2-61JG-20-1	Propeller General System
1C-130H-2-7	Electrical Systems
1C-130H-2-70FI-00-1-1	Engine Fault Isolation Manual
1C-130H-2-70FI-00-1-2	Engine Fault Isolation Manual

	Publication Number Publication Name
1C-130H-2-70FI-1-2	Engine Fault Isolation Manual
1C-130H-2-70GS-00-1	Engine General Servicing
1C-130H-2-71JG-00-1	Powerplant Operating Limits & Checklist
1C-130H-2-71JG-00-2	Basic Engine
1C-130H-2-73JG-00-1	Engine Fuel
1C-130H-2-73JG-00-2	Basic Engine
1C-130H-2-73JG-00-2	Temperature Datum Control
1C-130H-2-75JG-00-1	Engine Air
1C-130H-2-75JG-00-1	Engine Fuel
1C-130H-2-76JG-00-1	Engine Controls
1C-130H-2-76JG-00-1	Engine Controls
1C-130H-2-77JG-00-1	Engine Indication
1C-130H-2-79JG-00-1	Engine Oil
1C-130H-2-80JG-00-1	Engine Starting and Ignition
1C-130H-4	Illustrated Parts Breakdown, C-130
1H-65A-01	List of Applicable Publications
1H-65A-11-72-11B-2	LTS-101 750B-2 Overhaul Manual
1H-65A-11-72-2B2	LTS-101-750B-2 Maintenance Manual
1H-65A-11-72-4B2	IPB LTS-101 750B-2
1H-65A-2-1	Maintenance Manual
1H-65A-2-2	Wiring Diagram Manual
1H-65A-2-3	Avionics System Maintenance Manual
1H-65A-3	Structural Repair Manual
1H-65A-4	Illustrated Parts Catalog
1U-25A-2	HU-25 Maintenance Manual
1U-25A-23	Corrosion Control Manual
1U-25A-2-9	Wiring Manual
1U-25A-3	Structural Repair Manual

Publication Number	<u>Publication Name</u>
1U-25A-4	Illustrated Parts Catalog
2J-ATF3-2-1	Light Engine Maintenance Manual
2J-ATF3-2-2	Engine Heavy Maintenance Manual
2J-ATF3-2-3	Engine Inspection/Repair Manual
2J-T56-44	Turboprop Engine Model T56-A-7B, T56-A-15 IPB
2J-T56-53	Turboprop Engine Models T56-A-7B
2J-T56-56	Intermediate Maintenance Turboprop Engine
	Models T56-A-7B, T56-A-15
A1-H60CA-140-100	Flight Control System Organ. Maint.
A1-H60CA-140-200	Flight Control Systems Testing & Troubleshooting
A1-H60CA-140-300	Flight Control Systems Organ. Maint.
A1-H60CA-140-400	Flight Control Systems Organ. Maint. with IPB
A1-H60CA-150-100	Rotors Systems Organ. Maint
A1-H60CA-150-400	Rotor Systems Organ. Maint. with IPB
A1-H60CA-220-100	Powerplant Systems
A1-H60CA-220-200	Powerplant Systems Testing & Troubleshooting
A1-H60CA-220-300	Powerplant Systems Organ. Maint.
A1-H60CA-220-400	Powerplant Systems Organ. Maint. with IPB
A1-H60CA-240-200	Auxiliary Power Unit (APU) Testing &
	Troubleshooting
A1-H60CA-240-300	Auxiliary Power Unit (APU) Organ. Maint.
A1-H60CA-240-400	Auxiliary Power Unit (APU) Organ. Maint. with IPB
A1-H60CA-260-100	Transmission Systems Organ. Maint.

Publication Number	Publication Name
A1-H60CA-260-200	Transmissions Systems Testing & Troubleshooting
A1-H60CA-260-300	Transmission Systems Maint. Procedures
A1-H60CA-260-400	Transmission Systems Organ. Maint. with IPB
A1-H60CA-450-200	Hydraulic Power Systems Testing &
	Troubleshooting
A1-H60CA-450-300	Hydraulic Power Systems Organ. Maint.
A1-H60CA-450-400	Hydraulic Power System Organ. Maint. with IPB
A1-H60CA-490-100	Utility Systems Organ. Maint.
A1-H60CA-490-200	Utility Systems Testing and Troubleshooting
A1-H60CA-490-300	Utility System Organ. Maint.
A1-H60CA-490-400	Utility System Organ. Maint with IPB
A1-H60CA-AML-000	Aircraft Documentation List
A1-H60CA-GAI-000	General Aircraft Information Organ. Maint.
A1-H60CA-SRM-300	Structural Repair Manual
A1-H60CA-WCR-00	Wiring Systems Repair Organ. Maint.
A1-H60HA-110-100	Airframe & Landing Gear System Organ. Maint
A1-H60HA-110-200	Airframe & Landing Gear Systems Testing &
	Troubleshooting
A1-H60HA-110-400	Powerplant Systems Organ. Maint. with IPB
A1-H60HA-410-100	Environmental Control Systems Organ. Maint.
A1-H60HA-410-200	Environmental Control Systems Testing
	Troubleshooting

Publication Number	Publication Name
A1-H60HA-410-300	Environmental Control Systems Organ.Maint.
A1-H60HA-410-400	Environmental Control Systems Organ Maint. with
	IPB
A1-H60HA-460-100	Fuel System Technical Manual
A1-H60HA-460-200	Fuel System Testing & Troubleshooting
A1-H60HA-460-300	Fuel System Organ. Maint.
A1-H60HA-460-400	Fuel System Organ. Maint. with IPB
A1-H60HA-510-200	Instrument Systems Organ. Maint.
A1-H60HA-510-300	Instrument Systems Organ Maint.
A1-H60HA-510-400	Instrument Systems Organ. Maint. with IPB
A1-H60HA-560-100	Flight References & Automatic Flight Control
	Systems Organ. Maint.
A1-H60HA-560-300	Flight References & Automatic Flight Control
	Systems Organ. Maint.
A1-H60HA-560-400	Flight References & Automatic Flight Control
	Organ. Maint. With IPB
A1-H60HA-750-300	Weapons Delivery System Organ. Maint.
A1-H60HA-SRM-000	Structural Repair Manual
A1-H60HA-SRM-300	Structural Repair Manual
A1-H60JA-WCR-000	Wiring Systems Repair
A1-H60JA-WDM-000	Wiring Data Manual Organ. Maint.
A1-T700A-IPB-400	Turboshaft Engines Models T700-GE-401 &
	T700A-GE-401C
A1-T700A-MMI-200	Turboshaft Engine Models T700-GE-401 &
	T700A-GE-401C

APPENDIX C, REFERENCES

Publication Number	Publication Name
A1-T700A-MMI-210	Turboshaft Engine Models T700-GE-401 & T700-
	GE-401C
AC65-15A	Airframe and Powerplant Mechanics Airframe
	Handbook
AC65-9A	FAA Airframe and Powerplant Mechanics General
	Handbook
ACMS Index HC-130H	Maintenance Procedure Cards
ACMS Index HH-60J	Maintenance Procedure Cards
ACMS Index HH-65A	Maintenance Procedures Cards
ACMS Index HU-25A	Maintenance Procedure Cards
AFTO 1-1A-1	General Structural Repair
AFTO 1-1A-12	Fabrication, Maintenance and Repair of Transparent
	Plastics
AFTO 1-1A-14 (NAVAIR 01-1A-505)	Installation Practices for Aircraft Electric and
	Electronic Wiring
AFTO 1C-130A-3	Structural Repair Instructions
AFTO 2J-1-13	Cleaning of Gas Turbine Aircraft Engine and Parts
AFTO 33B-1-1 (NAVAIR 01-1A-16)	Nondestructive Inspection Methods
AFTO 33B2-7-11	Flaw Detector, Eddy Current Tester
AFTO 33B2-9-1	Eddy Current Tester
AFTO 42B5-1-2	Gas Cylinders (Storage Type) Use, Handling, and
	Maintenance
AFTO 4T-1-3	Inspection and Maint., Instructions, Storage &
	Disposition of Acft

AFTO 4W-1-61

All Type Acft. Tire Wheels-Maint. & O/H

APPENDIX C, REFERENCES

Publication Number	Publication Name
AF Extension Course, 53153 03 7701	Airframe Repair Specialist: Fundamentals
Volume 2	of Metalworking
AF Extension Course, 53153 03 7701	Airframe Repair Specialist: Fundamentals
Volume 3	of Metalworking
CGTO PG-85-00-50	Technical Information Management and Ordering
	Systems (TIMOS)
COMDTINST M3710.1 (series)	Air Operations Manual
COMDTINST M10550.25 (series)	Electronics Manual
COMDTINST M11000.11 (series)	Civil Engineering Manual
COMDTINST M13020.1 (series)	Aeronautical Engineering Maintenance
	Management Manual
COMDTINST M13520.1 (series)	Aviation Life Support Systems Manual
COMDTINST M1414.8 (series)	Enlisted Qualifications Manual
COMDTINST M16478.1 (series)	Hazardous Waste Management Manual
COMDTINST M5100.47 (series)	Safety and Environmental Health Manual
COMDTINST M6000.3 (series)	First Aid and Health Lesson Plans
COMDTINST M6260.2 (series)	Technical Guide: Practices For Respiratory
	Protection
NAVAIR 01-1A-24	US Navy Helicopter Vibration Analysis
NAVAIR 01-1A-503	Maintenance of Aeronautical Anti-Friction Bearings
NAVAIR 01-1A-509 (AFTO 1-1-691)	Aircraft Weapons Systems Cleaning and Corrosion
	Control
NAVAIR 04-10-1	Acft. Wheels and Organization Inter & Depot
	Maint.

APPENDIX C, REFERENCES

<u>Publication Number</u> <u>Publication Name</u>

NAVAIR 04-10-506 Acft. Tubes and Tires

NAVAIR 11-100-1 (series) General Use Cartridges, Cartridge Actuated Devices

for Aircraft

NAVAIR 15-01-500 Preservation of Naval Aircraft

NAVAIR 16-1-540 Avionics Cleaning & Corrosion Control Organizational & Intermediate

Maintenance

NAVAIR 17-15-50.1 Joint Oil Analysis Program

NAVEDTRA 12300 Aviation Machinist Mate 3&2

NAVEDTRA 12338 Aviation Structural Mechanic (H&S) 3&2

Seventh Edition The Coast Guardsman's Manual

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APPENDIX D, STUDENT FEEDBACK FORM

Instructions Please use this form for any feedback you may have concerning this course. Submit your recommendations IAW instructions on

page D-2. Note: Use the reverse side of this page if more space is needed.

How? Note your suggestions, corrections, and comments below:

Page	Location on Page	Recommendations

Your Comments If you were writing this pamphlet, what improvements would you make? What was good about it? What didn't you understand?

Please be specific in your comments/suggestions.

To Contact You Please provide the following information so that we can contact you if needed.

Name	Unit		Phone
		()

Submit Suggestions

After completing this form please mail, FAX, or phone your information to:

Commanding Officer PHONE: (252) 335-6418 U.S. Coast Guard Aviation FAX: (252) 335-6103

Technical Training Center

Attn: AMT Subject Matter Specialist (NRT)

Elizabeth City, NC 27909-5003

RECORD OF PERFORMANCE QUALIFICATIONS

DEPARTMENT OF TRANSPORTATION U.S. COAST GUARD

AMT

INSTRUCTIONS

Record of Performance Qualifications shall be completed for enlisted personnel of the Coast Guard and the Coast Guard Reserve as outlined in the Enlisted Qualifications Manual (COMDTINST M1414.8, series). As proficiency in each performance qualification is demonstrated, the DATE and INITIALS column shall be completed. Personnel are required to demonstrate proficiency in all new qualifications assigned to their rating. Qualifications previously demonstrated, dated and initialed off will not be recertified.

Prior to commencement of ADT, the member's Reserve Unit shall indicate, by circling in red, those qualifications which cannot be completed during inactive duty and should be completed on ADT.

Rating		Abbreviation
AVIATION MAINTENANCE TECHNICIAN	AMT	
Date completed all performance qualifications fo	or Rate Level.	
E-4 E-5	E-6	, ,
E-7 E-8)	
NAME (Last, First, Middle Initial) Social Security Nur		

PREVIOUS EDITION IS OBSOLETE LOCAL REPRO AUTH

SIGNATURE OF SUPERVISOR

DATE	NAME/SIGNATU RE	INITIAL S	RATE	UNIT
REMARKS	<u> </u>	<u> </u>		

RATING: A	VIATION MAINTENANCE TECHNICIAN (AMT)	Date	Initials
Major Duty:	A. Administrative Duty		
Task:			
4.A.01c	COMPLETE the Coast Guard Aviation Airman Syllabus.		
5.A.01c	COMPLETE assigned aircraft Aircrewmember Syllabus.		
5.A.02c	ORDER aircraft parts IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and local station instructions.		
5.A.03c	AUDIT technical publications and directives IAW the Technical Information, Management and Ordering System (TIMOS) User Process Guide, CGTO PG-85-00-50.		
5.A.04c	SUBMIT aircraft publication change requests IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and local station instructions.		
5.A.01	PREPARE the required forms for the Joint Oil Analysis Program (JOAP) IAW the JOAP Manuals, NAVAIR 17-15-50 (series) or for the Spectrometric Oil Analysis Program (SOAP) IAW the ATF3-6 Maintenance Manuals.		
6.A.01c	REVIEW discrepancy information from aircraft records and DETERMINE appropriate action IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and local station instructions.		
6.A.02c	PROCURE parts, tools, and other materials IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and the Small Purchase Handbook, COMDTINST M4200.13 (series).		
NAME /		CON	
NAME (Las	t, First, Middle Initial)	SSN	

RATING:	AVIATION MAINTENANCE TECHNICIAN (AMT)	Date	Initials
6.A.03c	PREPARE shop and aircrew training schedules IAW the Air Operations Manual, COMDTINST M3710.1 (series) and the Training and Education Manual, COMDTINST M1550.10 (series).		
6.A.04c	DIRECT personnel in the safe handling and disposal of hazardous material IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series); the Safety and Environmental Health Manual, COMDTINST 5100.47 (series); applicable Material Safety Data Sheets (MSDS); and state and local regulations.		
6.A.05c	ANALYZE Aviation Computerized Maintenance System (ACMS) component history data to identify trends and problem areas IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series).		
6.A.06c	ORDER technical publications, directives, and manuals applicable to rating IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series); the Directives, Publications, and Reports Index, COMDTNOTE 5600.0; and the Technical Information, Management and Ordering System (TIMOS) User Process Guide, CGTO PG-85-00-50.		
7.A.01c	ESTABLISH local safety procedures and standards for unit Aviation Engineering Department IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and the Safety and Environmental Health Manual, COMDTINST M5100.47 (series).		
7.A.02c	MANAGE rate-related Aviation Computerized Maintenance IAW the ACMS User's Guide, CGTO PG 85-00-10 and the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series).		
7.A.03c	PREPARE aircraft reports IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series).		
NAME (La	ast, First, Middle Initial)	SSN	l

RATING:	AVIATION MAINTENANCE TECHNICIAN (AMT)	Date	Initials
7.A.04c	REVIEW completed maintenance forms for compliance with the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series).		
7.A.05c	PREPARE the Unit Training Plan IAW the Training and Educational Manual, COMDTINST M1500.10 (series) and the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series).		
7.A.06c	MANAGE shop inventory processes IAW applicable publications.		
7.A.01	PROCESS aircraft for receipt and transfer IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and the Air Operations Manual, COMDTINST M3710.1 (series).		
8.A.01c	REVIEW applicable rating qualification codes and SUBMIT written recommendations to the Program Managers (G-SEA) IAW the Coast Guard Qualification Codes Manual, COMDTINST M1414.9 (series).		
8.A.02c	REVIEW unit aircrew flight requirements IAW the Air Operations Manual, COMDTINST M3710.1 (series) and the Coast Guard Pay Manual, COMDTINST M7220.29 (series).		
8.A.03c	REVIEW unit personnel qualification codes and UPDATE the Personnel Management Information System (PMIS) data base IAW the Qualifications Codes Manual COMDTINST M1414.9 (series).		
8.A.04c	MANAGE unit Aviation Engineering personnel duty assignments IAW station instructions and standing orders.		
8.A.05c	MANAGE unit Aviation Enlisted Assignment Process IAW the Personnel Manual, COMDTINST M1000.6 (series).		
NAME (L	ast, First, Middle Initial)	SSN	

RATING: A	VIATION MAINTENANCE TECHNICIAN (AMT)	Date	Initials
8.A.06c	PREPARE budget requests IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and the Manual of Budgetary Administration, COMDTINST M7100.3 (series).		
8.A.07c	REVIEW unit Personnel Allowance List (PAL) to ensure it reflects unit staffing needs IAW the Enlisted Qualifications Code Manual, COMDTINST M1414.9 (series) and the Coast Guard Staffing Standards Manual, COMDTINST M5312.11 (series).		
9.A.01c	REVIEW rate-related performance qualifications and SUBMIT written recommendations to the Coast Guard Training Managers (G-WTT) and Program Managers (G-SEA) IAW the Enlisted Qualifications Manual, COMDTINST M1414.8 (series).		
Major Duty:	B. Aircraft Maintenance		
Task:			
4.B.01	ANALYZE aircraft hydraulic systems to the component/wire level IAW the Aviation Hydraulic Manual, NAVAIR 01-1A-17; the Aviation Hose and Tubing Manual, NAVAIR 01-1A-20; and applicable publications.		
4.B.02	ANALYZE aircraft fuel systems to the component/wire level IAW applicable publications.		
4.B.03	ANALYZE aircraft lubrication systems to the component/wire level IAW applicable publications.		
4.B.04	ANALYZE aircraft landing gear systems to the component/wire level IAW applicable publications.		
4.B.05	ANALYZE aircraft brake systems to the component/wire level IAW applicable publications.		
4.B.06	ANALYZE helicopter powertrain systems to the component/wire level IAW applicable publications.		
NAME (Las	st, First, Middle Initial)	SSN	

RATING: A	AVIATION MAINTENANCE TECHNICIAN (AMT)	Date	Initials
4.B.07	ANALYZE aircraft propeller systems to the component/wire level IAW applicable publications.		
4.B.08	ANALYZE aircraft powerplant systems to the component/wire level IAW applicable publications.		
4.B.09	ANALYZE aircraft Auxiliary Power Unit (APU) systems to the component/wire level IAW applicable publications.		
4.B.10	ANALYZE aircraft environmental control systems to the component/wire level IAW applicable publications.		
4.B.11	ANALYZE aircraft start systems to the component/wire level IAW applicable publications.		
4.B.12	ANALYZE flight control systems to the component/wire level IAW applicable publications.		
4.B.13	ANALYZE electrical/electronic controls of aircraft engines to the component/wire level IAW applicable publications.		
4.B.14	ANALYZE aircraft anti-ice/de-ice systems to the component/wire level IAW applicable publications.		
4.B.15	ANALYZE aircraft oxygen systems to the component level IAW applicable publications.		
4.B.16	ANALYZE aircraft fire protection systems to the component/wire level IAW applicable publications.		
4.B.17	ANALYZE aircraft flotation systems to the component/wire level IAW applicable publications.		
4.B.18	ANALYZE aircraft hoist systems to the component/wire level IAW applicable publications.		
4.B.19	INSPECT aircraft stainless steel cable assemblies IAW the Aircraft and Missile Structural Hardware Manual, T.O. 1-1A-8 and applicable publications.		
NAME (La	st, First, Middle Initial)	SSN	

RATING: A	AVIATION MAINTENANCE TECHNICIAN (AMT)	Date	Initials
4.B.20	SAFETY WIRE and SHEARWIRE aircraft equipment IAW the Aircraft Electric and Electronic Wiring Manual, NAVAIR 01-1A-505 (series) and the Aircraft and Missile Structural Hardware Manual, T.O. 1-1A-8.		
4.B.21	REPAIR damaged and broken aircraft electrical wires, cables, and connectors IAW the Aircraft Wiring Manual, T.O. 1-1A-14 and the Aircraft Electric and Electronic Wiring Manual, NAVAIR 01-1A-505 (series).		
4.B.22	UTILIZE test equipment to ISOLATE faults in basic aircraft electrical circuits IAW applicable publications.		
4.B.23	REMOVE corrosion from aircraft structures and electrical components IAW the Aircraft Weapons Cleaning and Corrosion Manual, NAVAIR 01-1A-509; the Avionics Cleaning and Corrosion Control Manual, NAVAIR 16-1-540; and applicable publications.		
5.B.01c	PERFORM special inspections of aircraft and aviation equipment IAW the Aviation Computerized Maintenance System (ACMS).		
5.B.02c	PERFORM authorized modifications of aircraft and aviation equipment IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and the Aviation Computerized Maintenance System (ACMS).		
5.B.01	TROUBLESHOOT hydraulic system discrepancies to the component/wire level IAW applicable publications.		
5.B.02	TROUBLESHOOT aircraft fuel system discrepancies to the component/wire level IAW applicable publications.		
5.B.03	CALIBRATE fuel quantity indicating system IAW applicable publications.		
5.B.04	RIG and ADJUST power controls, fuel selectors, and shut-off valve linkages IAW applicable publications.		
NAME (La	st, First, Middle Initial)	SSN	

RATING: A	VIATION MAINTENANCE TECHNICIAN (AMT)	Date	Initials
5.B.05	TROUBLESHOOT aircraft lubrication system discrepancies IAW applicable publications.		
5.B.06	TROUBLESHOOT landing gear system discrepancies to the component/wire level IAW applicable publications.		
5.B.07	TROUBLESHOOT brake system discrepancies to the component/wire level IAW applicable publications.		
5.B.08	TROUBLESHOOT aircraft powerplant discrepancies to the component/wire level IAW applicable publications.		
5.B.09	TROUBLESHOOT Auxiliary Power Unit (APU) system discrepancies to the component/wire level IAW applicable publications.		
5.B.10	TROUBLESHOOT aircraft pressurization system discrepancies to the component/wire level IAW applicable publications.		
5.B.11	TROUBLESHOOT aircraft air conditioning system discrepancies to the component/wire level IAW applicable publications.		
5.B.12	TROUBLESHOOT starter system discrepancies to the component/wire level IAW applicable publications.		
5.B.13	TROUBLESHOOT ignition control system discrepancies to the component/wire level IAW applicable publications.		
5.B.14	TROUBLESHOOT flight control system discrepancies IAW applicable publications.		
5.B.15	RIG and ADJUST flight controls IAW applicable publications.		
5.B.16	TROUBLESHOOT engine electrical/electronic control systems IAW applicable publications.		
5.B.17	TROUBLESHOOT engine anti-ice/de-ice system discrepancies to the component/wire level IAW applicable publications.		
NAME (Last	t, First, Middle Initial)	SSN	

RATING:	AVIATION MAINTENANCE TECHNICIAN (AMT)	Date	Initials
5.B.18	TROUBLESHOOT windscreen anti-ice/de-ice system discrepancies to the component/wire level IAW applicable publications.		
5.B.19	TROUBLESHOOT aircraft oxygen system discrepancies to the component level IAW applicable publications.		
5.B.20	SERVICE aircraft oxygen systems IAW applicable publications.		
5.B.21	TROUBLESHOOT fire extinguisher system discrepancies to the component/wire level IAW applicable publications.		
5.B.22	TROUBLESHOOT fire detection system discrepancies to the component/wire level IAW applicable publications.		
5.B.23	REPLACE cartridges and cartridge-activated devices IAW the Use of Cartridge Activating Devices Manual, NAVAIR 11-100-1 (series).		
5.B.24	TROUBLESHOOT aircraft flotation system discrepancies to the component/wire level IAW applicable publications.		
5.B.25	SERVICE aircraft flotation systems IAW applicable publications.		
5.B.26	TROUBLESHOOT aircraft hoist system discrepancies to the component/wire level IAW applicable publications.		
5.B.27	REPLACE airframe seals IAW applicable publications.		
5.B.28	REPLACE panels in windshields, plastic enclosures, or windows IAW the Maintenance and Repair of Transparent Plastics Manual, T.O. 1-1A-12 and applicable publications.		
NAME (La	ast, First, Middle Initial)	SSN	

RATING: A	AVIATION MAINTENANCE TECHNICIAN (AMT)	Date	Initials
5.B.29	REPAIR corrosion damaged aircraft structures and electrical components IAW the Aircraft Weapons Cleaning and Corrosion Control Manual, NAVAIR 01-1A-509; the Avionics Cleaning and Corrosion Control Manual, NAVAIR 16-1-540; and applicable publications.		
5.B.30	TROUBLESHOOT aircraft components for excessive vibration IAW the Aviation Computerized Maintenance System (ACMS) and applicable publications.		
6.B.01c	DIRECT line crew operations IAW the Aviation Computerized Maintenance System (ACMS) and local station instructions.		
6.B.01	DIRECT the repair of aircraft systems IAW the Aviation Computerized Maintenance System (ACMS); the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series); and applicable publications.		
6.B.02	CALCULATE and ANALYZE engine performance data IAW the Aviation Computerized Maintenance System (ACMS) and applicable publications.		
6.B.03	SUPERVISE functional checks of aircraft systems IAW the Aviation Computerized Maintenance System (ACMS); the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series); and applicable publications.		
6.B.04	SUPERVISE flight control rigging IAW the Aviation Computerized Maintenance System (ACMS) and applicable publications.		
6.B.05	DIRECT the repair of aircraft structural damage IAW the General Structure Repair Manual, T.O. 1-1A-1 and applicable aircraft Structural Repair Manuals (SRM).		
NAME (La	st, First, Middle Initial)	SSN	

RATING: A	AVIATION MAINTENANCE TECHNICIAN (AMT)	Date	Initials
6.B.06	INSTRUCT personnel in the safe handling of cartridges and cartridge activated devices IAW the Aviation Computerized Maintenance System (ACMS) and applicable publications.		
Major Duty:	C. General Aviation		
Task:			
7.C.01c	REVIEW the unit aircraft salvage plan IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series); the Shipboard-Helicopter Operational Procedures Manual, COMDTINST M3710.1 (series); applicable aircraft manuals; and local station instructions.		
7.C.02c	DIRECT Quality Assurance (QA) inspections IAW the Aviation Computerized Maintenance Systems (ACMS); the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series); and applicable publications.		
7.C.03c	PREPARE the following types of local maintenance instructions IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series):		
	 Continuing Action Maintenance Instruction (CAMI) Single Action Maintenance Instruction (SAMI) Technical Information Maintenance Instruction (TIMI) 		
Major Duty:	D. Shop Maintenance		
Task:			
4.D.01	REPAIR metal structures IAW the General Structure Repair Manual, T.O. 1-1A-1 and applicable aircraft Structural Repair Manuals (SRM).		
4.D.02	APPLY aircraft paints IAW the Aircraft Weapons Cleaning and Corrosion Control Manual, NAVAIR 01-1A-509 and applicable publications.		
NAME (La	st, First, Middle Initial)	SSN	

RATING: A	AVIATION MAINTENANCE TECHNICIAN (AMT)	Date	Initials
4.D.03	REPAIR tertiary composite structures IAW the Composite Repair Process Manual, T.O. 1-1-690 and applicable publications.		
4.D.04	INSPECT aircraft components using Non-Destructive Inspection (NDI) methods IAW the NDI Methods Manual, T.O. 33B-1-1 and applicable publications.		
4.D.05	FABRICATE aircraft stainless steel cable assemblies IAW the Aircraft and Missile Structural Hardware Manual, T.O. 1-1A-8 and applicable publications.		
4.D.06	REPLACE packings and gaskets in aircraft systems IAW the Aviation Hydraulic Manual, NAVAIR 01-1A-17 and applicable publications.		
5.D.01c	INSTRUCT personnel in shop safety procedures IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series); the Safety and Environmental Health Manual, COMDTINST M5100.47 (series); and applicable publications.		
5.D.01	INSPECT aircraft components using the Eddy Current Non-Destructive Inspection (NDI) method IAW the NDI Methods Manual, T.O. 33B-1-1 and applicable publications.		
5.D.02	PRESERVE and DE-PRESERVE aircraft equipment IAW the Preserving Naval Aircraft Manual, NAVAIR 15-01-500 and applicable publications.		
5.D.03	BUILD UP aircraft wheel and tire assemblies IAW applicable publications.		
5.D.04	INSPECT engine internal components parts for service and repair limits IAW applicable publications.		
NAME (La	ast, First, Middle Initial)	SSN	

RATING:	AVIATION MAINTENANCE TECHNICIAN (AMT)	Date	Initials
6.D.01c	DIRECT shop maintenance IAW Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and applicable publications.		
6.D.02c	INSTRUCT personnel in the proper disposition of defective aircraft components IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and applicable publications.		
6.D.03c	INSPECT work areas, tools and aviation equipment for safety compliance IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and the Safety and Environmental Health Manual, COMDTINST M5100.47 (series).		
6.D.04c	COORDINATE calibration and repair of special tools and measuring equipment IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and local station instructions.		
NAME (L:	ast, First, Middle Initial)	SSN	

RATING: AVIATION MAINTENANCE TECHNICIAN (AMT)

TERMINOLOGY

ANALYZE: To separate into fundamental parts or basic principles so as to determine the nature of the whole.

APPLICABLE PUBLICATIONS: The appropriate aircraft system, component or general aviation instruction.

AUDIT: An official examination and verification of publications and directives.

COMPONENT: An item designed to be removed and replaced on the aircraft.

CALCULATE: To ascertain by mathematical methods; compute.

FABRICATE/BUILD UP: To construct by combining or assembling.

REVIEW: To examine for the purpose of correcting possible errors.

SAFETY WIRE: The process of applying lockwire to prevent accidental loosening.

SERVICE: To provide minor maintenance, i.e. supplying with water, fuel, oil and air.

SHEARWIRE: The process of applying shearwire to prevent accidental actuation.

TROUBLESHOOT: The process of diagnosing, locating and repairing faults in equipment by means of systematic checking or analysis.